FOOD INDUSTRIES

The Journal Devoted to the Problems of the Food Manufacturer

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Laurence V. Burton, Editor

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Bad Forecasting

Every man may have the moral right to make his own economic forecasts, but those who listen should take comfort in the fact that nearly everybody is always wrong about the future. Before voicing unhappy predictions—even in private—one should be in possession of all the possible influencing factors, including the weather forecast. Hopes, longings, and emotions must be ruled out, and facts with cold logic must be the only basis.

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Weather

Keep your eye on weather. It is more important to recovery than all the palliatives proposed in Washington. Given the right weather, scarcity values will accrue to farm commodities which will lead to recovery of farm buying power. All we want to do here is to urge amateur and professional business forecasters to include the tremendously important weather factor in their calculations. All known trends may be dour, but the most vitally important factor is still unknown.

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Quick Eating

Quick-freezing and quick-smoking are technical developments of the current decade. Now comes quick eating. Those who enjoy their Grape Nuts for breakfast always have required an extra five minutes for the meal. General Foods Corp. has solved the time problem by putting out Grape Nut Flakes, which permit rapid eating in true American style. Sales of slower eating Grape Nuts have increased, contrary to expectations. Similar possibilities of product improvement are still open to others.

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Consent Decree

The current inning in the Packers' Consent Decree case was lost by the packers, which was no surprise to those who knew in advance that certain justices of the Supreme Court would be unable to participate in the decision. The Consent Decree did not in any way change the too great ratio of productive capacity to possible consumption that led to the rapid development of the more efficient chain methods of distribution. Nor did it lead to economic security for wholesalers. Distribution profits cannot be captured via the legislative or judicial route.

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Research

About two years ago we criticized an unnamed concern which disbanded its research department. Curiously, a flood of protests came from all over the country. The shoe fitted in many unexpected places. Today there is another chapter to tell about that same concern. It has hastily assembled a research organization and is now trying to do several years of development work in a week or two. One of its competitors had kept on plugging at research and recently has put a new line of products on the market—products which are excellent, going over well, and causing the non-researching concern no end of bother. The new products are not particularly difficult to manufacture, but try to do it at a profit!

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Opportunity

Dairy and baking industries should get together to educate the public on milk as an ingredient of foods. Bread made with milk is better than bread made with water alone, costs more, and tastes better. Why not educate the consumer to see this value and to pay more for it? Not more sales, but more profitable sales, is the way to profits.

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Formulas

Every so often we are importuned to publish formulas for this or that food, a request we have refused. The editors have plenty of formulas in their personal files, including those of some of the best-known and most popular nationally advertised brands. But what good would it be to donate a formula to someone who had not the *facilities;* who did not know *how* to manufacture, or *how to sell* the goods at a profit? Do they who would like to cut into another's business believe that any food manufacturer is not now selling every bit of his product that he can possibly dispose of by all the known methods of merchandising? Is Heinz out of pickles? Is Loose-Wiles or National Biscuit Co. out of crackers? Is Campbell out of soup? If you want to beat the other fellow, don't try to imitate his product; make a better one! Furthermore, a formula that can be picked up from the printed page is likely to be of little commercial value.

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Bottle Explosions

Appeal from the decision is still pending in the case where a small bottler was assessed $40,000 damages for an eye lost through explosion of a bottle of carbonated beverage. Continued re-use of old bottles had worn bottoms paper thin. If you are fond of cheap bottles, better learn how to inspect bottoms; and remember that cheaper bottles usually have less glass. Think it over.

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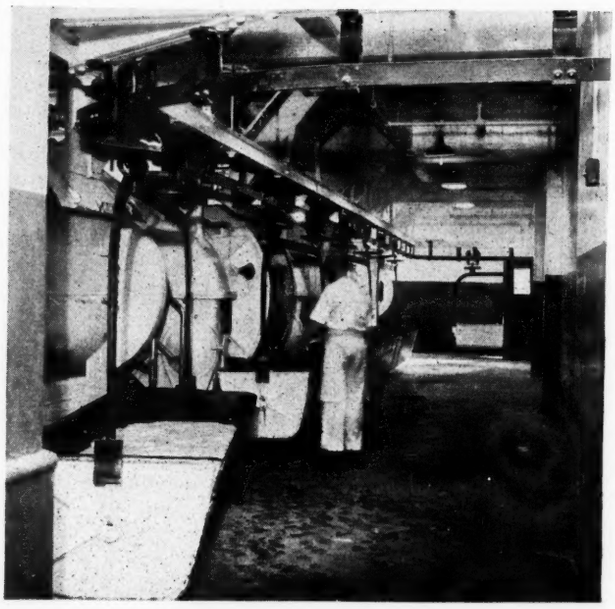
An Evil

"Our business is no longer a business. It is an evil," says a pickle manufacturer. Reasons: most pickle salters have a two- to three-year supply of brine stock. Common sense dictates a shutdown, but common sense is not so common. Fresh dills can be sold, but they cannot be produced without also making a lot more brine stock. Operations will proceed at 60 per cent of 1931.

Overhead Conveyors Lower Bakery Production Costs

By E. S. STATELER
Assistant Editor, Food Industries



Troughs enter mixing room through swinging door at far end of room. when loaded they pass through door in foreground to be weighed just inside fermentation room

FACED with the alternative of again enlarging its recently rebuilt plant or adopting material handling methods used successfully in other industries, Freihofer Baking Co., Philadelphia, Pa., chose the latter means of building up its production to take care of its rapidly increasing sales volume.

As bakers of cakes, sweet goods such as cinnamon buns and Danish pastry, hard and soft rolls, and bread ranging from the 1-lb. to the familiar 5-lb. pullman loaf, the company had equipped its reconstructed plant with gas-fired ovens and other up-to-date equipment to handle an hourly production volume equivalent to 27,200 one-pound loaves of bread. However, oven capacity and sheer man-power were not sufficient to step up the production rate to give the desired volume. Means had to be found for plugging up the leaks in the processing steps preliminary to the baking operation.

When more man-power was added the workers became so numerous that they hindered rather than aided operations. Also in the confusion that accompanies overcrowded working areas errors were likely to be made which would affect the quality of the finished products and create instead of prevent wastes.

Here, as in various other branches of the food processing industries, there is much handling of lots or batches through successive stages of manufacture. These batches usually represent several hundred pounds of materials and are of sufficient bulk to require containers of considerable size in which the batches may be moved from and to various locations in the plant where they are processed.

In addition to being large enough to hold the mass of the batches in the manufacture of bread, biscuits, and crackers, these containers, known as troughs, must provide for a condition which is found only in the baking industry. Owing to fermentation action the bulk of the sponge and dough batches increases considerably during a relatively short period. Also these batches must be handled in such a way that they can be kept under time, temperature, and humidity control and at the same time be relatively free from contamination by dirt, undesirable micro-organisms, and materials that will impart a foreign flavor, odor, or color.

The troughs in which these batches are handled, formerly made of wood, but now quite generally fabricated from steel and kept well greased to prevent corrosion, vary in dimensions and shapes depending upon the nature of the product, upon conditions and type of floors peculiar to the plant in which they are to be used, and upon their first cost. Disregarding these variable factors, troughs familiar to the baking industry usually have the common feature of being mounted on swivel casters capable of being pushed in any direction and are dependent upon the type and physical condition of the floors for the ease and speed with which they are moved.

Except when lightly loaded or when the floors and casters are in excellent condition and of special construction two or more men are required to move the loaded troughs from place to place. Furthermore, it is not uncommon to have casters broken off because of irregularities in or obstacles on the floors and for troughs to become difficult to move due to fibers, dust, and bits of dough picked up by the casters from the floor surfaces. The mobility of these caster-fitted troughs permits careless or indifferent workers to divert batches from their normal course and "lose" or mix them up with other troughs containing doughs that are similar in appearance. All of these factors imposed a hindering influence upon satisfactory routing of sponges and doughs through the mixing and fermentation departments and added an unnecessary 6 per cent to the cost of production in those departments.

Similar retardation prevailed in the routing of the molded doughs from the dividers and molders to and through the proof rooms to the ovens. In the course of this routing there is much handling to be done in a definite sequence and manner for the production of a satisfactory product at a low unit cost.

For the handling of the molded doughs into the proof rooms and to the ovens, and for the return of empty baking pans to the molders, as well as for storage of the pans when not actually in use, precaution had to be taken against putting too heavy a load on any one rack. This meant that to handle a given production or take care of a definite number of pans a greater floor space in the proof rooms and in the pan-handling and storage areas would be necessary than if fewer but heavier loaded racks

or carriers were to be used. In this molder-to-oven handling was an opportunity to make a 5-per cent saving in production costs.

For many years other industries, especially non-food ones, had been finding overhead trolley-type conveyors valuable aids in solving production problems. Probably the most outstanding instances in the food industries where these trolley-type or tram-rail conveyors had been successfully used up to that time (1926) were to be found in the handling of slaughtered animals in packing plants and of loaded retort baskets in canning plants. Otherwise the food industries had been slow to adopt this means of speeding up plant operations or increasing plant productiveness without adding to the size of the plant. Even in these two food industries the layouts were relatively simple and the path of operation more likely to be in a straight line instead of the network of lines and cutover switches which the Freihofer Baking Co. installations necessitated because of the many operations involved.

At the time the plant was rebuilt, after a disastrous fire a few years previously, it was laid out so that materials in process take a gravitational course through the plant after the raw materials have been elevated to the storage bins at the top of the plant or to the relatively small ingredient weighing rooms adjacent and to the rear of the mixers. From these mid-floor levels the sugar, malt, milk, salt, yeast, and other ingredients are added to the mixers in vertical positions after the weighed flour and metered water have been loaded preliminary to the mixing of sponges or doughs, as the case might be.

The flour, stored, blended, and sieved in the flour room at the bottom of the plant, is previously carried by bucket elevator conveyors to twelve 75-bbl. storage bins (one for each mixer) on the floor above the mixers. From these bins, screw conveyors transport it to the weigher hoppers supported over the mixers.

Mixers, with individual motor drive and of the latest tilting-bowl type fitted with the safety pushbutton contacts for starting the motor when the mixer bowl is in tilted position, were set in a line facing the dividing wall between the long, relatively narrow mixing rooms and the spacious fermentation rooms. Doors at each end of the long, narrow area between the mixers and the wall opened into the fermentation rooms.

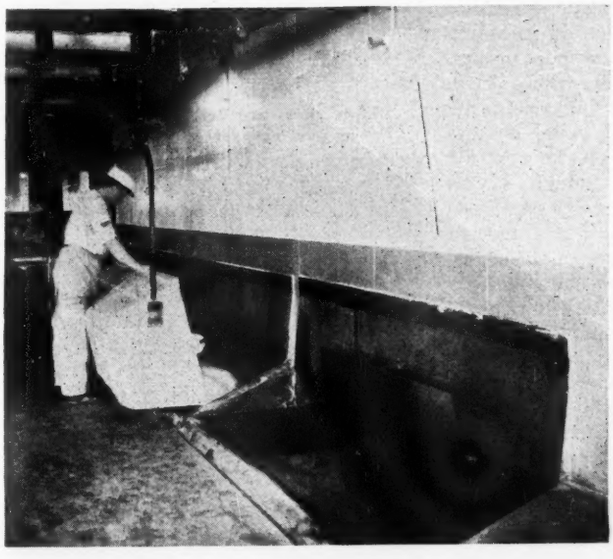
Wide-mouthed steep-pitched steel chutes with hinged covers connect the sponge fermentation room with the dough mixers on the floor below. Similar chutes join the dough fermentation room with hoppers to the dividers on the succeeding floor below.

When an operator of the dough mixers or of the dividers desires another sponge or dough, according to the operation involved, he signals the attendant in the particular fermentation room by means of a gong. At the same time he turns on the electric light, located on the wall directly over the mouth of each chute, to indicate to which mixer or divider the sponge or dough is to be delivered. When delivery has been made to the machine, the signal light is turned off and the emptied trough directed to the mixing room to be refilled.

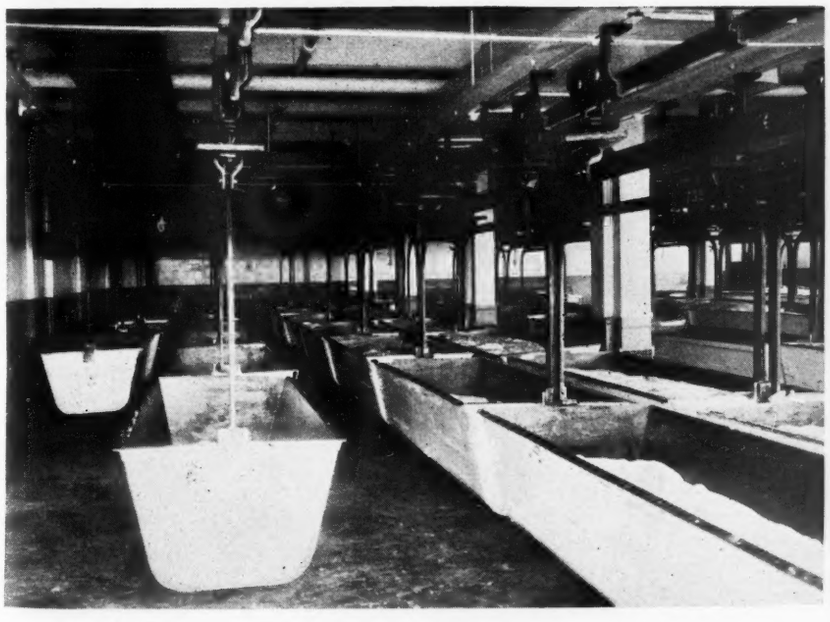
As is common in modern bread plants, the dough passes progressively from the dividers to the rounders, the overhead proofers, and molders to be placed in pans. From the molders the panned dough moves on the same floor to the proof rooms, where it is held the desired length of time under controlled temperature and humidity conditions preparatory to being taken to the traveling ovens on the same floor. At the delivery end of the ovens bread is emptied from the pans onto a cooling conveyor suspended from the ceiling of the room below and is cooled under atmospheric conditions to the desired temperature for wrapping in wax paper or for slicing preliminary to wrapping in wax paper. The pans return to the molding department or are sent to the pan washing department before returning to the molding department or put in temporary storage.

In the sweet goods and roll departments, which are on the same floor with the dough mixers, the dough moves in a relatively straight line through the shaping machines to the proof rooms and finally to the traveling and rotary ovens, according to the type of product.

With such a set-up as this an overhead trolley-type conveyor system was decided upon as a means of speeding up operations sufficiently to meet the demands for greater and more flexible production without increasing the floor space of the production area and at the same time cut down production costs to the extent of 6 per cent in the mixing and fermenting departments and 5 per



Left—Upon signal from floor below contents of next trough in line is emptied into chute under light signal



Below—Shallow metal pan under each trolley prevents dirt from rails or trolleys from falling into troughs

cent in the molder-to-oven operations.

Tram-rail systems of the Worcester type were installed in the mixing and fermentation rooms, giving a 7-ft. clearance between the floor and the rail on which the trolleys run. Steel troughs of uniform size and shape are suspended from a pair of anti-friction type trolleys running on top of a single rail by means of a yoke which supports the troughs on trunnions centrally located on each end of the troughs. Troughs are locked in an upright position to prevent upsets until the operator manually releases the lock to tilt the trough and turn the contents into the mouth of the chute. After being emptied the troughs return to their normal upright and locked position, ready to be sent to mixing room for refilling.

In both the sponge and dough departments the trolley rails were installed by suspension from the ceilings of the respective rooms to form an encircling compass of three sides of the fermentation rooms and the full length of the mixing rooms directly in front of the mixers in such a way that the mixers can discharge directly into the suspended troughs. In the fermentation rooms connecting lines run parallel to each other and at right angles to the long dimension of the fermentation rooms. These lines are as close to each other as is possible to give clearance between the suspended troughs and are connected at each end by manually operated switches so that trolleys can be directed to the right or left on the encircling track as desired with the general direction from right to left for movement of loaded troughs from mixing to fermentation rooms and for empty troughs from fermentation to mixing rooms.

As loaded troughs move from the mixing to the fermentation room they pass over a short section of the track which in a measure "floats" free from the rest of the installation and is connected with a dial-type weighing scale so that weight checks can be kept on each sponge or dough mixed. When not released by trip or lever action for weighing purposes, this section is an integral part of the installation and allows trolleys to pass uninterruptedly over it if desired.

When the plant is running on heavy production schedule and sponges or doughs are being called for and sent to the floor below from the discharge end of the fermentation room practically as fast as the freshly mixed sponges and doughs are coming in at the receiving end of the respective fermentation room, each trough makes a round trip in the interval of time required to give the desired fermentation period of 3¾ hours in the sponge and 30 minutes in the dough stages. Thus the loaded troughs follow each other into the fermentation rooms in a definite order and have a definite relative position in the room to fill up lines that are being emptied at the delivery side of the room.

In less busy times only as many troughs are used as is necessary to keep production at desired rate. Such controlled rotation of troughs tends to keep sponges and doughs moving in an orderly and uniform manner and to eliminate "lost" or mixed-up batches.

An overhead conveyor system of the Richards-Wilcox steel-beam type has performed similar service in speeding up operations in the bakeshop proper. In this part of the plant, where 15-ft. ceilings are the rule, the steel-beam track, with swivel ball-bearing trolleys running in sets of four on the opposite surfaces of the lower flanges of an I-beam type, is suspended by steel rods and trusses to give a head clearance of 7 ft. From these trolleys are suspended racks that are capable of being heavily loaded with pans of molded doughs to go to the proof boxes and then to the ovens, where the racks are emptied into the ovens and sent back empty by a route around the proof boxes to the molding department. There they are met by carriers heavily loaded with empty pans from the discharge end of the oven, or from the pan washing, storage, and greasing departments to be reloaded and sent again to the proof rooms and ovens.

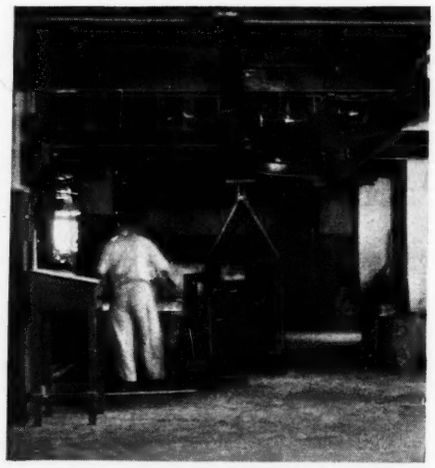
Here again manually operated switches that join straightaway lines of overhead conveyor track with branching or circuitous lines permit quick and easy transportation of heavy loads with economical use of man-power and without damage to floor surfaces.

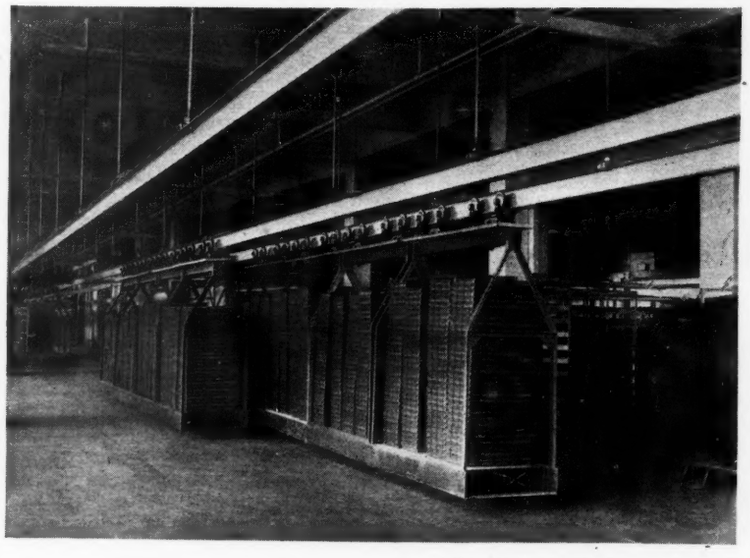
Both types of trolleys are fitted with shallow metal pans directly under the trolleys to prevent dust and dirt dislodged from the overhead track from falling into the troughs or pans below.

So successful has this method of material handling proved that in the past six years numerous bakeries and other food handling plants have made similar installations.

Such installations have found particular application in the handling of perishables such as bananas. In this application the use of the tram-rail type of conveyor serves the purpose of economic handling of materials and for the prevention of waste occasioned by damage to the fruit through manual handling. These units also provide for hoisting the fruit from one level to another in a vertical manner as well as conveying it from one location to another on the same level.

Empty pans are delivered by carrier to pan greaser near molders





Trolleys run in sets of four on each side of beam to carry heavy loads in proofing and baking departments

How Alkalis Are Used In Bottle Washing

IN A RECENT release from the Service Laboratory of the American Bottlers of Carbonated Beverages, Julian H. Toulouse, the laboratory director, gave information on the use of alkalis in bottle washing. The following is taken from this report.

Safety in bottling practice lies in keeping the sterilizing power of the washing solution at a sufficient height. It should be kept above state regulation requirements. Suppose state regulations call for a 3 per cent solution of caustic soda. This is a minimum figure below which the washing machine should not operate. If the solution just barely registers 3 per cent in the morning, where will it be at night? Assuredly, it will not be over 3 per cent, and the chances are that it will not be over 2½ per cent, if that high. For this reason the solution should be built up to at least 3½ per cent before the start of operations and should not be allowed to fall below the minimum required by the regulations.

Alkalis used in bottle washing are essentially compounds of sodium. These are:

1. Sodium hydroxide (also called sodium hydrate and caustic soda). The basis of germicidal power due to alkali alone.

2. Sodium carbonate (or soda ash). Used with caustic soda as a basis of most washing powder. Not of high germicidal power, but good detergent and free rinser. When combined with caustic soda it gives an increased total germicidal power.

3. Sodium bicarbonate (does not exist in the presence of caustic soda).

4. Trisodium phosphate. (An excellent detergent and free rinser.) Often sold as an additional material for washing solutions. Slightly better than soda ash as an alkaline germicide but cannot replace caustic soda for this purpose. In combination with caustic soda, is similar to soda ash in increasing germicidal power.

5. Sodium Metasilicate. A product apparently of equal alkaline germicidal powers with other alkalis except caustic soda, and for which good detergent qualities are claimed.

It has long been the custom to employ only water in the last compartment of the compartment type soaker. This procedure undoubtedly aided in the rinsing but it has been found to be a possible source of trouble from yeast that passes through the entire washing intact, because protected within some unremoved foreign matter. The trouble was quickly remedied by the use of alkali in the last compartment as well. Rinsing was improved by using only the alkalis known as detergents and free rinsers.

The same solution is used to wash bottle after bottle, and unless the bacteria are destroyed they will accumulate until the solution is dumped. The rinse water cannot be relied upon to remove bacteria that are on the bottle when it leaves the soaker solution. If bacteria are not killed in the soaker solution, they will remain in the bottle and much of the benefit of the washing process is lost.

Heat as well as alkali is necessary to insure sterile bottles. The A.B.C.B. standard is 130 deg. F. provided that the contact time is 5 minutes or more, and that a total of 3 per cent alkali, of which 1.8 per cent is caustic soda, is used. Bottle breakage is rarely encountered at 130 deg. F. if a warm-water rinse is used.

It is in rinsing that difficulty from the standpoint of sanitation may occur. Some bottlers overlook the fact that the rinsed bottle can be no better than the rinse water used. This water should be of the highest sanitary quality. It is not too drastic to say it should be of better quality than that used in syrups and in carbonation, since syrups can be sterilized, and carbonation helps to eliminate microorganisms entering by way of the water to be carbonated.

Chlorinated rinse waters can be resorted to if all other methods fail to provide water of satisfactory quality. If too much chlorine remains in the water, it can be removed by means of any of the carbon filters now offered. At least one bottle-washing set-up which has been using a chlorinated rinse water has not found it necessary to de-chlorinate the water before it comes in contact with the bottle.

After the bottle has been rinsed it should be free from alkali. This fact can be tested for by adding a few drops of a 1 per cent alcoholic solution of phenolphthalein (obtainable at your pharmacist's) to a rinsed bottle. If no red color appears, there is no free alkali left in the bottle.

No process of washing and filling bottles is complete without adequate inspection of both the empty bottle and the finished product. Inspection facilities should be such that the entire bottle can be seen.

State Requirements Governing Type and Strength of Solutions for Washing Bottles

State	Solution	Temperature	Soaking Time
Alabama	3% Alkali (comprising 60% caustic)	120° F.	5 min.
Arizona	No specific provision	.....	.....
Arkansas	Bottles must be sterilized	.....	.....
California	No specific provision	.....	.....
Colorado	No specific provision	.....	.....
Connecticut	3½% Alkali	120° F.	5 min.
Delaware	3½% Caustic	120° F.	3 min.
Dist. of Col.	Bottles must be thoroughly washed	.....	.....
Florida	No specific provision	.....	.....
Georgia	No specific provision	.....	.....
Idaho	No specific provision	.....	.....
Illinois	No specific provision	.....	.....
Indiana	3% Caustic, or caustic equivalent	120° F.	5 min.
Iowa	3% Caustic, or caustic equivalent	120° F.	5 min.
Kansas	3% Caustic, or caustic equivalent	125°F.	10 min.
Kentucky	3% Alkali (comprising 1.8% caustic)	120° F.	.....
Louisiana	3% Caustic, or caustic equivalent	120° F.	.....
Maine	Bottles must be sterilized	.....	.....
Maryland	2½% Caustic, or caustic equivalent	125° F.	.....
Massachusetts	Bottles must be cleaned and sterilized	.....	.....
Michigan	3% Caustic, or caustic equivalent	120° F.	5 min.
Minnesota	4% Caustic, or caustic equivalent	110° F.	5 min.
Mississippi	5% Caustic (or equivalent disinfectant)	112° F.	10 min.
Missouri	3% Alkali	.....	.....
Montana	3% Caustic, or caustic equivalent	.....	.....
Nebraska	4% to 5% Caustic	140 to 160° F.	10 min.
Nevada	No specific provision	.....	.....
New Hampshire	3½% Caustic or caustic equivalent	120° F.	5 min.
New Jersey	3% Alkali (renewed weekly)	125° F.	10 min.
New Mexico	5% Caustic	.....	10 min.
New York	No specific provision	.....	.....
North Carolina	Bottles must be soaked in alkali or caustic	.....	.....
North Dakota	No specific provision	.....	.....
Ohio	3% Caustic, or caustic equivalent	120° F.	5 min.
Oklahoma	Bottles must be soaked in hot chemical solution	.....	10-20 min.
Oregon	No specific provision	.....	.....
Pennsylvania	3% Caustic	110° F.	5 min.
Rhode Island	3% Caustic, or caustic equivalent	100° F.	5 min.
South Carolina	No specific provision	.....	.....
South Dakota	3% Caustic, or caustic equivalent	120° F.	5 min
Tennessee	No specific provision	.....	.....
Texas	3% Caustic, or caustic equivalent	120° F.	.....
Utah	No specific provision	.....	.....
Vermont	Sterilized with boiling water or steam	.....	.....
Virginia	Sterilized with boiling water or steam	.....	.....
Washington	No specific provision	.....	.....
West Virginia	No specific provision	.....	.....
Wisconsin	5% Alkali or 3% caustic	125° F.	10 min.
Wyoming	No specific provision	.....	.....

Russia Enters The Canning Business

By Our Special Correspondent

FOR the past two years the American canning industry has been reported to be more or less apprehensive of the possible results of the development of a canning industry in Russia. No really definite knowledge about it has gone to America, on account of the rather strict censorship that has existed, but, quite recently, Associated Press dispatches from Russia show that the Soviet expects to capture a share of the world's market for canned foods and has begun to do this by exporting a shipment of 150,000 cans of pork and beans—one of the easiest products packed—to England. In order to allay the growing apprehension on the part of American canners, who fear further losses of foreign markets, the story of the development of this branch of the food industry in Russia is presented.

In March, 1930, the Russian Five-Year Plan called for the development of a food canning program for which approximately $100,000,000 was to be spent in building and equipping 27 canning plants and for the technical services of a requisite number of American specialists.

The usual commission examined localities in Russia and chose Krimskaya as the site for a large combination vegetable canning plant. The choice was made more for political reasons than for any other, for the Soviet wanted the peasants to see large plants everywhere in their own communities. From the standpoint of an adequate supply of raw materials, the location is a very doubtful choice. The soil is very good, but the normal rainfall is less than one-third of that in our corn-producing states and, worse yet, it comes at the wrong time of the year.

Krimskaya, in the North Caucasus, is in a section depending on the Black Sea (according to Russians) for the moisture in the air to produce its crop. From May to November there is little or no rain, but 1931 was the exceptional year in which more rain fell than has precipitated there in the last 100 years. In 1930, however, the season was very hot and dry, which, according to the best available Russian advices, is the usual form of summer weather.

About $500,000 worth of American canning machinery was ordered in the early part of March, 1930. Gerlach Brothers, of Mankato, Minn., were engaged to plan a large model plant for Krimskaya and also two smaller units to be located elsewhere. Henry Gerlach went to Russia to supervise the construction. N. B. Ritchey, of Franklin, Ind., also went over in an advisory capacity.

Much misinformation is existent regarding the plant. Superficially it has the appearance of a most complete canning plant, but it is rather deficient in many respects. On account of a Russian law aimed at conserving cement, the concrete was mixed in the ratio of 15 parts of sand and gravel to 1 part of cement, instead of the customary 5 to 1, or even richer mixture. Such a lean concrete could not withstand wear and tear, and floors immediately became seriously damaged with holes, and it was not difficult to dig into the concrete anywhere with a pocket knife. Furthermore, this was a serious matter when anchoring machines to the floors, for they easily pulled loose.

The plant has a capacity of 60,000,000 cans per year, but the Russians expect to increase the amount to 100,000,000 when it is running at maximum capacity. To put this quantity of production through the plant will require operating three shifts every day, but is expected to close it one month out of every year for general repairs.

Twelve experts from the United States accompanied the machinery when it was delivered, to assist in the erection of the equipment and also to assist with the first corn pack. The Krimskaya plant was operated in the autumn of 1930 for a small experimental pack, despite the fact that an enormous acre-

Krimskaya and Kherson, where the two new canning plants of the U.S.S.R. are situated, are in the Black Sea region of European Russia

age of sweet corn had been planted. At that time, about one-fourth of the construction still remained to be completed by Russian labor before the next pack, in the 1931 season, but despite the small amount of work to be done, the plant had not been completed when the 1931 pack started. It was not even able to turn its wheels until fifteen days after the first corn was ready to can and about the same length of time after the first tomatoes had been brought to the factory.

Although it has a huge capacity, it has never yet been operated at more than 10 per cent of capacity. The lines of canning machinery up to and including the filling machines are capable of handling cans at the rate of 120 per minute, based on No. 2 cans, but the closing machines which immediately follow the filling machines are twelve years old and are rebuilt machinery capable of operating at a maximum of

Camels are the draft animals used in planting corn at the collective farm called "Lenin's Way" at Armavirsky, near Krimskaya

only 65 cans per minute. The slow speed of the closing machines naturally regulates the speed at which all preceding machinery may operate.

A can-making department was installed at the plant where No. 2 cans were irregularly turned out, but No. 10 cans, which were to be used most of the time, could be used only during the last few days of the 1931 pack. This misfortune was the result of the decision of authorities in Moscow who sent students to take the No. 10 can-making equipment apart in order to make blueprints, so that they could immediately manufacture additional No. 10 can-making machinery. But after taking it apart for this purpose, the No. 10 machinery was not put back together properly and its successful operation was delayed almost until the end of the season.

The results on the agricultural side also are interesting. In 1931 there were planted 12,000 acres of corn, but out of this acreage 1,000 acres was lost because of high water and 10,000 acres was lost because the plant was not ready to operate and because of a shortage of tinplate from which to manufacture cans. Of the 5,000 acres set out to tomatoes, 4,200 acres was destroyed by high water, leaving only 800 acres on which to operate. Yet, despite this remarkable curtailment due to floods, only a very small percentage of the small tomato crop actually harvested was canned, because the tomato equipment was not sufficiently completed to enable them to pack tomato paste until the early part of October, 1931.

The Soyuzkonserv, or Soviet Canning Trust, which controls the canning industry of the country, placed the blame on the peasants for not having delivered their crops to the factory, whereas the real truth is that the factory operators ordered in only a limited quantity, because the plant was in no position to handle more.

Many curious things happened in starting this plant which are difficult for Americans to understand. For example, after the first day of operation no help appeared at the factory. Inquiries among them revealed that they were very tired from the previous day's work! After one day of rest they returned to the factory, but during the subsequent four days there was no electric current available to drive the machinery because of a breakdown in the electric power plant, located some distance away. This, in turn, was traced to a poor grade of oil being used there. The Moscow newspaper *Pravda* (meaning in English, "Truth") sent a reporter to Krimskaya and later published his analysis of the situation. *Pravda* believed that the problem was one of incompetency on the part of the Russian management in not completing the plant in proper time for operating, in not being able to operate it when it was ready, providing unfit living conditions for workers, lacking houses, and having insufficient food. The shake-up which followed, however, has not shown any great improvement over the previous régime.

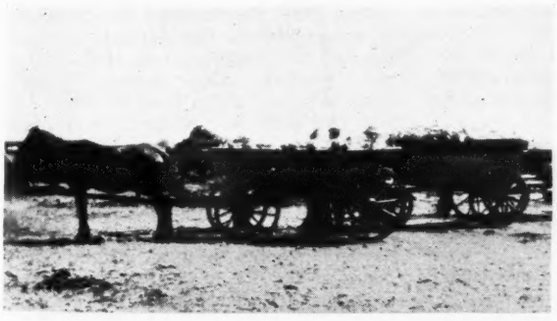
During the winter of 1930-31, with the advice of C. L. Blackstone, of Oakland, Calif., the Krimskaya plant began to pack pork and beans for the Russians. Although his specialty was fruit packing and he brought with him a long experience in packing fruit in California, unfortunately the Soviet had not yet constructed the fruit canneries which he had been told were already in existence. Therefore, when he arrived he was sent to Krimskaya, which was a canning factory, although equipped only for vegetable packing and not for fruits. The only American who had had experience in packing pork and beans was at the plant at that time, but his advice was not sought by the Russians.

When the dry beans were shipped to the factory they arrived in bulk carloads with every conceivable kind of beans mixed together. There were black beans, brown beans, red beans, white and black speckled beans of both large and small sizes, all dumped together. When received at the factory they were stored on the floor in a pile about 2 ft. 6 in. deep where they drew dampness through the concrete and immediately began to mold. Tomato paste shipped to Krimskaya, to be used in the bean sauce, was very dark brown, scorched, and possessed a decided metallic flavor. All of the piping for tomato products was black iron pipe, because enameled pipe is not known in Russia. Up to now the Russians consider that black pipe is satisfactory. The pork, which was shipped in from outside, was yellow and slippery, showing considerable age; the garlic and onions for the greater part were more or less rotten. Of these raw materials, nevertheless, pork and beans apparently satisfactory to the Russian domestic market were produced.

The canning program has been greatly curtailed. Instead of the 27 large plants which were to be built in the Five-Year Plan and were to be operating by 1932, Krimskaya is the only one operating, and Kherson is still under construction. We hear of no others. Lack of money makes the purchase of more American equipment impossible for the Russians. A further factor militating against the purchase of American equipment is the fact that German manufacturers are extending very liberal credit, sometimes two and three year credit, with no down payment. In cases where down payments are required, the amount is rather small. Italy also is supplying some of the equipment for the canning industry.

In view of their difficulties, the Russians realized the need for further American help and made some new contracts, but it was later necessary for them to repudiate these contracts because they could not fulfill the dollar clause. The *valuta* allotment of the canning trust had been exhausted. If Krimskaya had completed its anticipated 1931 pack, funds probably would have been available, for it was understood that the entire pack had been sold for future delivery to Turkey.

Any American working in Russia



Left — Wagons loaded with sweet corn waiting to unload at the Krimskaya canning plant

Below — Much of the raw material for the Krimskaya plant is delivered by these primitive ox-carts

Soyuzphoto, Moscow

simply gives advice, but although the entire management of a plant may agree with his advice, if the workers disagree, the work is done as the workers decide, for this is a land of a workers' aristocracy.

The last word in canning equipment was placed in this plant, with the exception of the old, rebuilt, closing machines, but in spite of this, the young engineers and Russian pattern makers took all the machinery apart in order to make patterns from which additional duplicate machinery was to be constructed.

At one time a number of small springs from the corn cutters were daily found on the floor by the Americans, who were at a loss to understand how this could occur. It was later explained one morning when a young Russian worker was found standing on the cutters, using them as a table or ladder in order to perform some overhead work. Although the Americans remonstrated with him, explaining why he should not walk on the machines, the Russian replied, "I ate black bread to pay for these machines and I can walk on them if I want to."

Although Soyuzkonserv was short of money and lacked enough to provide a sufficient number of horses and wagons with which to transport the raw materials from the farms to the factory, the tomato pit was lined with decorated tile. Apparently it was not realized that this entire pit would be covered with a floor.

It is rather unlikely that Russian canned food will ever reach the perfection of the American product, because the Russians seem to pay scant attention to the adage that cleanliness is next to godliness. It is not unusual for worm-damaged fruit to get into the cans in the present state of the industry, and sometimes the worms go along with the fruit. From observations in Russia, one would suspect that the contents of a swelled can does not in any way disturb the Russian constitution. Apparently, a Russian can eat it and thrive.

Among the Americans who are still employed by the canning trust in Russia are:

John Tucker, of Livingston, Mont., a graduate of the University of Southern California and formerly with Libby, McNeill & Libby, is in charge of about 250 Russian engineers and draftsmen. He is engaged in designing new plants and layout of equipment and is making recommendations as to what to purchase.

Donald Barr, of St. Cloud, Minn., is a technical adviser and gives processing formulas and similar information. His position is that of a sort of official answerer of questions about the canning industry.

All matters relative to the manufacture of tin cans are referred to Morris Vodioni, of Maywood, Ill., where he was formerly with the American Can Co.

. . . . The factory that was not built

EARLY in 1929 a party of Russians, accompanied by an interpreter, called at the office of FOOD INDUSTRIES to learn the names of designers of American canning plants. The names of several well qualified consultants were suggested.

"Have you any idea of what a good consulting engineer will cost you?" we inquired.

The idea struck them as a rather interesting one.

"What would a good consulting engineer cost us?" the interpreter asked.

"About $100 a day."

"That is nothing. We have $40,000,000 to spend."

• Below are given the specifications of the capacity of the projected plant, which they proposed should be located at Astrakhan:

Daily capacity

Tomatoes	125,000 cans
Fish	35,000 cans
Meat	30,000 cans

Annual capacity

Fish	4,000,000 cans
Meat	4,500,000 cans
Tomatoes	20,000,000 cans

• To one who has had no contact with the canning industry, a little interpretation of these figures will reveal some startling oddities, particularly on the tomato figures. If the Russians wanted 20,000,000 cans of tomatoes packed in a year and specified that the daily capacity of the plant should be 125,000 cans, it would require that the plant operate 160 days to grind out the total pack. But a tomato crop in our best tomato producing areas in the United States will normally mature within a period of from six to eight weeks, or about 60 days at the maximum. Therefore, the plant would require a daily capacity of not 125,000 cans but about 370,000 cans.

• But it is impossible to start any factory at full speed on the first day, even with experienced help. Furthermore, no crop matures with suddenness. Tomatoes start to come into the plant slowly at first, then faster and faster, until at the end of the third week the glut is on. No one can know in advance how it will end. Plants must be designed to take care of the peak loads or huge quantities of raw materials will deteriorate or even actually spoil. To meet this condition would necessitate that the projected Russian plant have a capacity of about 550,000 cans per day instead of the 125,000 cans originally specified.

• A little calculation shows that the area of tomatoes under cultivation necessary to supply this huge plant would be between 8,000 and 10,000 acres, or about 15 square miles, based on a yield of about four tons of tomatoes per acre. To gain some idea what this means, consider the tomato canning industry in the State of Indiana, one of the well developed tomato areas of this country. In Indiana there are approximately 143 canning factories operating on tomatoes, and in a year of normal production the entire state will have between 50,000 and 60,000 acres of tomatoes under cultivation.

• In contrast to this, the Russians had expected to put all their eggs into one basket, to put under one roof all the machinery equivalent to about 102 existing factories in Indiana and to cultivate an area equivalent to one-eighth of the tomato acreage of Indiana, the largest tomato producing state.

• Naturally, an informed person would remonstrate with the series of Russian visitors who frequently called at this office, and point out the uneconomic size of the plant, also the dangers of crop failures from plant diseases, insects, sun scald, hail, storms, early frosts, late frosts, floods, drought, muddy roads, lack of help, lack of water, breakdowns, as well as a host of other problems which are not peculiar to canning but are common to all industrial endeavors. This advice apparently fell on deaf ears. The fetish of American "efficiency" was uppermost in their minds. The new canning industry was to be completely Fordized—it looked so easy, on paper.

• The final suggestion given to them was that they engage the services of the only consulting agronomist in the United States who has had a wide experience in locating successful canning plants. His name and address were gravely recorded by a half dozen serious Russian investigators. They would confer with their clients in Moscow. It was explained that he would study the soil, the terrain, the rainfall, drainage, weather, labor, waste disposal, transportation, and a host of other details that must be considered in locating a successful plant. One of the Russians wanted to know how long it would take, but on finding that six months would be required, at the very minimum, the idea of a consulting agronomist was dropped instantly, because of the urgent need of keeping up with the Five-Year Plan.

• What subsequently transpired we, in America, probably will never know, but the Astrakhan project was ultimately discarded and a plant was built at Krimskaya by Soyuzkonserv, the Russian canning trust.

• In the accompanying story, our special correspondent tells us of some of the problems met by Americans who went to Russia to start the new enterprise. The foregoing tale of antecedent events will furnish a background that may partially explain much to one who desires to forecast the trend of events in Russia and learn how the food industry of the United States may be affected by these new developments.

LAURENCE V. BURTON,
Editor

How Freezing Affects Microbial Growth*

By J. A. BERRY
Frozen Pack Laboratory
Seattle, Wash.

DURING the season of 1930, the U. S. Bureau of Plant Industry put up in the Pacific Northwest an experimental pack of frozen fruits and vegetables intended largely for bacteriological researches. This pack consisted of 2,700 1-lb. containers of Marshall and Clark's Seedling strawberries, 1,300 containers of Cuthbert raspberries, 360 of Montmorency cherries, 800 of peas, and 650 of string beans. The conditions of pack prior to freezing included for the berries washed and unwashed, as well as ripe and overripe batches, "straight" pack, water pack, syrup pack, 10-65 deg. Brix, holding 2 to 36 hours before freezing, the use of paper cups, cans sealed without vacuum and with preliminary storage of containers at subzero temperatures for varying periods. Peas and beans were blanched and unblanched, packed "straight" and in brine, in paper cups and vacuumized and unvacuumized cans. In addition, while some containers of these vegetables were treated as controls, the majority were inoculated with from four to ten million spores of *Clostridium botulinum*, types A or B. Sets consisted of from six to twelve containers and the final storage temperature in all cases was 15 deg. F. To date some two hundred containers, chiefly strawberries, have been analyzed bacteriologically.

The total count on the strawberries before freezing varied from 7,500 to 100,000 per gram, with an average for sound washed fruit of about 20,000 per gram. The chief organisms were penicillium, rhizopus, botrytis, mucor, stemphilium, fusarium, yeasts, and spore-forming bacteria. Percentages varied.

Bacteriologically, the following summary is warranted: A diminution in numbers of microorganisms of from 90 to 99 per cent and over had occurred during the year's storage, in most cases only a few hundred penicillia and spore-forming bacteria, including *B. mycoides*, being yielded per gram. Yeasts appear to have succumbed to the degree that, when several dozen cans were stored at room temperature, only a few swelled in two weeks. Cans as a rule show no increase in microbial numbers at the end of such a two-weeks period, surviving bacteria being inhibited by the acidity of the medium, about pH 3.5, while molds are deprived of the necessary oxygen. The material, then, actually may "keep," though some physical deterioration takes place.

Doubtless, variations in the conditions of pack, such as delay in freezing, are better reflected in the physical condition of the pack than in its visible microbial content after a year's cold storage, when initial microbiological differences have been largely "smoothed out." Cultural tests of poor material after prolonged cold storage may reveal nothing significant regarding its sanitary history, which can best be gaged by the texture of the pack and the Howard microscopic test. It has been noted that the microbial content of berries held at summer temperatures may rise to several millions per gram in 24 hours, while pure culture studies of yeast and molds isolated from berries show that at temperatures of from 70 to 90 deg. F., growth is very rapid, but falls off markedly below 60 deg. F. (see Table 1).

To trace the fate of microorganisms in frozen-pack berries, 270 containers holding approximately 12 oz. of Evergreen blackberries and 4 fluid oz. of 40 deg. Brix syrup were prepared. One-third of these were paper cups, one-third No. 2 sealed cans, and one-third No. 2 sealed cans vacuumized to 20 in. In turn, one-third of each type was stored at —5 deg. F., one-third at 15 deg. F., and one-third at 28 deg. F. Bacteriological analyses have been made fortnightly for sixteen weeks. The count of the freshly packed berries, consisting chiefly of cladosporium, penicillium, oidium, flavobacteria, yeasts and bacilli, totaled 48,000 per gram. Results of the last analysis are given in Table II.

Findings in Table II are in close accord with those previously obtained. The 28 deg. F. vacuumized can had lost its vacuum, the 28 deg. sealed can showed 3-in. pressure, while the —5 and 15 deg. F. vacuumized cans showed 10- and 9-in. vacuum, respectively.

The high count from the paper cup held at 28 deg. F. is due to growth of pink yeasts and molds; the low counts from cans held at the same temperature are presumably due to the accumulation of carbon dioxide from respiration of the berries. It would seem that an air-tight container of whatever material, in addition to minimizing oxidation of fruit, is best, from a bacteriological viewpoint, for frozen pack.

The possibility of botulism from frozen-pack vegetables is frequently discussed. The question as to whether the botulinus organism will grow and elaborate toxin at cold-storage temperature can, it appears, be answered in the negative. In studies of the minimum temperature requirements of different strains of *Cl. botulinum*, both type A and type B, no evidence of growth over periods of four weeks at 31 deg. F. could be obtained nor was the inoculated material toxic to white mice.

The possible danger lies, then, in "keeping" frozen-pack vegetables after thawing. It should, however, be remembered that, depending on the length of the cold-storage period, botulinus organisms, if present, would have to compete with a myriad of other forms, some of them anaerobic or facultatively so. Produce like spinach and broccoli normally harbor a million or more organisms per gram, and washing and blanching do not remove all. Inasmuch as *Cl. botulinum* in pure culture requires at least three days for toxin production, it would seem that the activities of other organisms in frozen-pack goods would be so apparent in that time that the material would be discarded. Moreover, frozen-pack vegetables as a rule require cooking, which renders botulinus toxin harmless.

Of twenty cans of blanched peas and ten cans of unblanched string beans inoculated with *Cl. botulinum* spores fifteen to eighteen months previously, none proved toxic either on thawing or on standing at room temperature for from three days to three weeks. Likewise, four "control" uninoculated cans of peas and four of beans of the same pack failed to develop toxin over a similar period. To date *Cl. botulinum* has not with certainty been recovered from inoculated material. It should be noted that positive results in similar experiments have been reported by other workers.

Table I—Effect of Temperature on Growth of Yeast in Wort

Initial count per cc.	Incubation temp. deg. F.	Count at 24 hr. per cc.	Percentage increase, approximately
220,000	100	82,000,000	37,000
375,000	90	102,000,000	34,000
295,000	80	110,000,000	37,000
255,000	70	86,000,000	29,000
225,000	50	700,000	130
310,000	32	310,000	0

The 80- and 90-deg. cultures were stabilized at the 24-hour period. Counts were made with a Neubauer haemacytometer, at 2-hour intervals, for cultures at 70 deg. F. and above. The figures indicate the extreme importance of keeping produce cool.

Table II—Effects of Four Months' Storage at Freezing Temperatures

Container	Storage Temperature Deg. F.	Microorganisms per gram after 4 months
Paper cup.....	—5	36,000
Paper cup.....	15	20,000
Paper cup.....	28	500,000
No. 2 can, sealed.....	—5	40,000
No. 2 can, sealed.....	15	6,000
No. 2 can, sealed.....	28	200
No. 2 can, vacuum...	—5	30,000
No. 2 can, vacuum...	15	800
No. 2 can, vacuum...	28	200

*Abstracted from a paper read at the meeting of the Northwest Fruit Barrelers' Association, Seattle, Wash., January, 1932.

Fiberboard Export Cases Save Space and Weight

By H. L. STILWELL
Packing Engineer
San Francisco, Calif.

JUST as it took some time for the pasteboard box to develop into the fiberboard domestic shipping container, so it has taken time for the latter to develop into the export shipping container. It has been estimated that fully 80 per cent of all domestic shipments are made in fiberboard, yet many manufacturers do not think of the possibility of using fiberboard cases for export shipments. However, for two classes of food products entering largely into foreign trade, canned goods and raisins, the fiberboard case is now finding wide acceptance.

One of the advantages of the fiberboard case is its light weight. A case of average canned food that weighs about 62 lb. in a wooden case will weigh about 57 lb. in fiber. A box of raisins containing 25 lb. net and weighing 29 lb. gross in a wooden container will weigh about 27 lb. gross in fiber. Both of these differences amount to about 8 per cent of the gross weight.

Possibly of more importance than the weight is the lesser bulk of the fiberboard container. This amounts to 7.5 to 15 per cent, depending somewhat on the packages that are compared, and means that more boxes may be placed in a freight car or steamship hold. Warehouse capacity likewise is increased when fiberboard cases are used.

On account of its being constructed of one piece of fiberboard, the package remains tight and firm and does not become loose by drying out. Neither does it tend to fall to pieces from excessive vibration and handling. Its uniformity in size and shape and its smoothness and freedom from projections make it a package easily and securely stacked and stowed and rapidly and confidently handled by employees, who quickly learn that injuries from it will be few and far between.

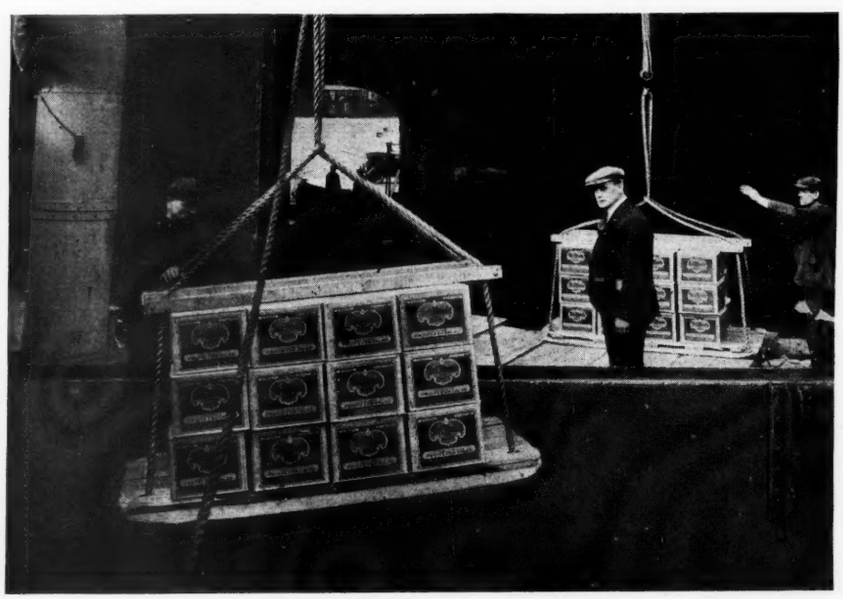
An unusual advantage of the fiberboard container is found in what may be called the available "billboard" space. The average fiberboard case has on the sides and ends a space a little larger than a street-car card. This can be printed in any colors or with any device the manufacturer may desire. Few shipping containers can offer an equivalent amount of advertising space that can be as attractively printed. Moreover, as fiberboard containers are frequently re-used for miscellaneous purposes by retailers and consumers, the billboard space may remain valuable for a long time.

No assembly of several small pieces at the plant is required for fiberboard cases, since they arrive at the cannery or factory warehouse complete in one piece, printed and folded flat. The folded containers are economical of space, both in shipping to the factory and in storage there prior to use, as they occupy only about one-fourth of the space required for sufficient shook for the construction of the same number of cases.

Unless a contents label has to be printed on the cases, it is necessary only to set up the fiberboard containers before filling them. A supply of flat cases is brought from storage to a point near the can labeling machine. A girl can easily unfold and set them up, ready for the packer to fill either by hand or from a casing machine. A paper liner is placed in raisin or dried-fruit boxes before filling them. Some plants stitch the bottoms of the cases at this point, but the usual practice is to use an automatic top and bottom sealer, rather than bottom stitching with only a top sealer. When filled, the unsealed cases are moved away on a roller conveyor to the automatic sealing machine, from which they are conveyed to the warehouse stacks or shipping platforms. This procedure is simple and involves but few steps. Both time and labor are at a minimum.

Most of the objections raised to fiberboard cases for export purposes arise from a lack of real knowledge of what an export fiberboard case is like. They are frequently confused with the light cases so often used for purely local shipments, although these are quite different from the sturdy and specially constructed containers used for export. One of the objections sometimes heard is that the cases are easily damaged and have little strength. As a matter of fact, the strength of the case depends on the design and the materials used in fabricating it. In cases of canned goods, the cans themselves stand the strain when

Fiberboard cases of canned fruit going ashore at Liverpool. The cases are placed on a sling, right side up, and spreader bars are used to keep the ropes from pulling against them



the cases are properly stacked; that is, with the cans on end. This requires that the cases be stowed flat and that the first case in the pile be placed upon an even surface. Practically no losses will be caused by container failures when the export fiberboard cases are properly handled and stowed. This risk has been eliminated by the shock-absorbing qualities of the material and by its style of construction.

If the contents of the case cannot carry any of the vertical pressure, as is true with bulk dried fruit, for example, it will be necessary to reinforce the sides and ends of the cases. This is done in designing the export case for raisins. A light-weight but sturdy collar of double, double-corrugated fiberboard is fitted snugly around the inner walls of these containers, giving more than the strength necessary to permit high stacking in warehouses, ships' holds, or freight cars. Using this design, thousands of tons of raisins are now successfully shipped in fiberboard boxes, holding 25 lb. net, to both foreign and domestic markets.

On account of the permanence of the fastening, a good fiberboard case will withstand more abuse than might be expected. Of course, it cannot be indiscriminately tossed around or dropped on the corners or edges. Where there is possibility of damage by water, the export fiberboard case has advantages. It is essentially waterproof, unless it is soaked for hours, and moderate exposure to water injures neither the contents nor the case itself. If the fiberboard case has been soaked long enough to cause it to go to pieces, relabeling and transfer of cans to a new case is no more difficult than with a wooden box.

As far as the minor injuries that frequently happen to shipping cases in transit are concerned, the fiberboard case is easily repaired. Small holes and corner tears can easily be mended with heavy gummed paper or cloth tape. If the case is a complete wreck, the only tools that are necessary to transfer the contents to a new case are a bucket of mineral glue (sodium silicate) and a brush. It is even possible to include a few extra cases in the shipment in event of major damage, since they can be laid flat and thus occupy very little space. If it becomes necessary to open cases for customers' inspection or the inspection of a buyer, this may be done very readily without tools, and the cases can be quickly resealed by the application of mineral glue.

The use of fiberboard cases for export shipment requires some education of transportation workers, stevedores, warehouse-men, and truckmen. All these handlers have shown a willingness to learn because they quickly discover that these cases are light in weight and pleasant to handle. The stevedore's hook has to be taken away from him, and the cargo sling used in steamship loading has to be modified to avoid severe sidewise pressure on the cases. When filled, the cases must rest flat on top and bottom and not on the sides and ends. With the observance of these simple rules, the fiberboard case, when properly designed and manufactured for export purposes, becomes a suitable container—uniform, smooth, light, and easily handled.

Above, the proper way to open a fiberboard case. By pressing downward against the end flaps, rather than pulling upward on the side flaps, tearing of the case is prevented. Below, two ways of resealing fiberboard cases, using mineral glue (sodium silicate) (left) and gummed tape (right)

▼

How Coffee Consumers Do Their Buying

TASTE AND FLAVOR decide 42.2 per cent of the coffee purchasers in their choice of brands, according to a survey among 3,352 families in 62 cities and towns of Massachusetts, Connecticut, New York, New Jersey, and Pennsylvania, as reported by O. Q. Arner, of the Brazilian-American Coffee Promotion Committee. Surprisingly, only 6.4 per cent of the consumers select coffee because of its price, and only 10.7 per cent are influenced by dealer recommendations. Housewives seem to consider the opinion of a friend about as good as that of the dealer, since 10.1 per cent of them buy brands recommended to them by friends. Perhaps the dealer is too often "stocked" but not thoroughly "sold."

There seems to be a large number of "floaters" among the coffee fans, as the statistics show that 27.5 per cent of the consumers are still seeking taste and flavor satisfaction and are now using brands on trial.

Over 55 per cent of the consumers procure their favorite brands from chain grocery stores, and 27.18 per cent buy from independents. About 7 per cent patronize specialists, and the other sources are so small as to be negligible. The survey also showed that independent grocers make their best showing with families of high income in large cities, while most of the chain store patrons are among the families of low income, in all cities.

Convenience is the reason given by a third of the consumers for buying coffee from a particular store. Almost 14 per cent select the grocer who offers the best prices, and about one-tenth hunt out the grocer that gives them the best service.

In the five states in which the survey was conducted, it was found that the average family purchases coffee 3.2 times per month, buying an average of 1.5 lb. at a time. The data also show that the families of higher income buy more coffee than do those of lower income, making about the same number of purchases but taking more at a time.

By and large, the practice is to buy 1 lb. of coffee at a time, indicating that the public realizes how much freshness has to do with the flavor of the beverage.

Ultra-Violet Rays Prevent Molding of Bread

By WM. L. OWEN
Consulting Bacteriologist
Wm. Wolfe Baking Co.
Baton Rouge, La.

SANITATION, chlorination, and air purification have often been recommended and sometimes used in food plants for the control of this seasonal scourge. In baking plants, especially when stale returns are permitted, there is much concern, but comparatively little action, regarding its control. Complete eradication is impossible, because the mold spores are almost always present in varying quantities. In tropical countries, where the temperature is perennially within the limits in which mold fungi thrive, there is no relaxation on this score for the food man.

Bread and cake, especially when wrapped, are excellent media for mold growth and unfortunately, by their perishability, render impractical the better known methods of product treatment to kill the mold spores on their exteriors.

The author, in this article, gives the results of his work with ultra-violet rays, which should be an indication to all food manufacturers that the possibilities of ultra-violet rays in food processing are not yet fully known.

THE PROBLEM of mold prevention in bread has been and is being met in many different ways, none of which is really effective when the bread is subjected to unfavorable conditions of storage. If we could protect the loaves of bread from the oven to the wrapper, so that they would not be exposed to the mold spores in the dust of the air, there would not be any mold problem, because bread, when it comes from the oven, is sterile as far as molds are concerned. In rare instances the spores of a mold have been known to survive the baking process, but this is very rare indeed. In fact, there is only one recorded instance of mold spores withstanding the effects of baking temperatures.

Under practical baking conditions it is almost impossible to protect bread on the conveyor in such a manner as to keep it from acquiring various kinds of mold spores from the air. It is even more difficult to protect it successfully from such infection while it is on the cooling racks. While the use of conveyors and a cooling room supplied with filtered air would contribute a great deal toward the solution of the problem, it would not be infallible in its effectiveness, for sterile conditions could not be uniformly maintained at all times. In southern climates, particularly in those of lower Southern states, the losses from moldy bread during the summer months constitute a very serious problem. It is one to which the Southern bakers are giving more and more attention, especially since the introduction of sliced bread, which is more susceptible to mold than the unsliced loaf.

For a number of years the writer has had this problem under investigation, and has observed it throughout all seasons of the year. As we have previously observed, the infection of the bread begins with the deposition of the mold spores upon the crust after the loaf has left the oven. In unsliced bread the infection spreads from the crust to the crumbs, because the cracks in the crust allow the mold hyphae to penetrate the crust and spread to the crumb. With the almost universal production of sliced bread throughout the country, the mold problem has become even more difficult, because the sliced loaf furnishes innumerable angles and crevices for

penetration of the hyphae into the interior of the loaf. Strange as it may seem, however, the crust is more favorable for mold development than the crumb. Herter[1] attributes this fact to the presence of dextrins and water soluble carbohydrates in the former, which are much more available food than the starch of the crumb. If the moisture content of bread is over 25 per cent, the bread is susceptible to mold; hence it can be imagined how susceptible to this trouble is normal bread with its 45-58 per cent of moisture. Evidently we can never hope to control molding of bread by decreasing its moisture content to a point where mold spores will be prevented from germinating on account of lack of moisture.

In the modern bakery, the mold problem is simplified by the fact that it is necessary to prevent mold development for only a period of 96 hours from time of manufacture. After this period has elapsed bread is considered stale and has lost its sale value, regardless of whether it is or is not moldy. The baker's problem, therefore, is to keep his loaf free from mold colonies for that period of time. This seems simple enough to those unacquainted with the rapidity of mold growth at summer temperatures and the density of mold infection in the air in these latitudes. In the solution of this problem of moldy bread, we have already referred to the reduction of the opportunities for its infection as one of the practical means for its control. During our investigation of this problem we have carried out a great many tests of the avenues of infection of bread and have found that without an exception bread, as it leaves the oven, is practically sterile as regards its susceptibility to mold development.

Bread collected in a sterile paper sack as it left the oven, inserted after cooling into a sterile wrapper, and placed in an incubator at 90 deg. F. rarely developed any mold at all (see Table I).

Table I—Effect of Handling Methods

No. of test	Manner of collecting	Temp. stored	Results	Time required to develop
1 (control)	By hand from oven	90 deg. F.	Moldy	24 hours
2	(a)	90 deg. F.	No mold	5 days
3	By hand	90 deg. F.	Mold	48 hours
4	(b)	90 deg. F.	Mold	24 hours
5	From oven Sterile sack	90 deg. F.	No mold	5 days
6	From rack Sterile sack	90 deg. F.	Mold	24 hours

(a) By sterile forceps from oven into sterile sack. (b) By hand from cooling rack into sterile sack.

These are but a few of the many tests we have made to determine the avenues of infection of freshly made loaves of bread in a modern bakery; the results merely confirm the observations of Herter and Fornet,[2] Turley,[3] and others. To determine the concentration of the infection in various parts of the bakery, tests were made by exposing plates with a special agar medium in different locations in the plant. The results of these were as given in Table II.

From the exposures given in Table II, it is apparent that bread has abundant opportunities to become infected with mold from the moment it leaves the oven until it is finally wrapped. Even then, if the wrapper has been exposed to the air, it probably will be as badly infected with mold as the bread itself. We can reduce this concentration or density of mold in the air by various means, such as: by rigid treatment of floors and walls of the building with some suitable fungicide, such as sodium hypochlorite, or fluoride, and by frequent application of whitewash to the walls. However, under the best of conditions these substances offer only temporary relief. Also, both sodium fluoride and whitewash might be objected to because of the unfamiliarity of the user with the fluoride and of flaking off in the case of whitewash. One of the best of all preventive treatments is to add a substance which tends to fill in the crevices of the walls with an impervious germicidal coating; for example, aluminum hydrosilicic acid, which not only contributes to the waterproof properties of the surface but endows it with permanent germicidal properties.

Table II—Distribution of Mold Throughout Plant

Plate location	Exposure time, min.	Mold colonies per plate
At flour bins	3	5
In mixing room	3	3
Around oven	3	3
Over conveyor	3	5
On loading platform	3	8
Over wrapping machines	3	3

Slicing machine is frequently the source of mold infection, as indicated by these bread slices

After we have exhausted all of these possibilities, we are still confronted with a great and increasing need for some method by which we can partially sterilize our bread just as we wrap it (we use "sterilize" in a very restricted sense and intend that it apply exclusively to mold fungi). As chemical and physical methods are alike inapplicable to the problem, our only hope is to resort to photochemical means of sterilization.

However, we have omitted mention of another preventive measure to which a varying degree of importance is attributed by the bakers throughout the country. Jalade[4] many years ago discovered in connection with an outbreak of moldy bread, which he found was caused largely by some of the Mucor group of molds, that the addition of acetic acid sufficient to bring the pH to about 3.1 (0.2 per cent acetic acid) usually corrects this trouble. It is the writer's opinion that in this case the corrective principle is the nature of the acid added rather than the pH attained, for as a rule molds find this degree of acidity remarkably suited to their development. In this connection, mention might be made that acetic acid, per se, has a fungicidal action and has been taken advantage of by the writer in a process for the prevention of deterioration of sugar cane (baggasse residual fiber from the milling of cane) by subjecting it to an acetic fermentation.

However, no chemical treatment probably will ever be found that can be successfully applied for the prevention of moldy bread and at the same time conform to the food laws of this or any of the other advanced nations of the world. Substances like salicylic acid, for example, which have been demonstrated to be of value for this purpose, would of course be out of the question in the light of modern health laws.

We are indebted to Houghton and Davis[5] and to Fairhall and Bates[6] for one of the earliest studies of the effects

of short wave lengths of light upon the mold fungi. More recently Welch[7] has studied this action in detail, using ultra-violet rays, and concluded that molds are destroyed by ultra-violet rays in comparatively short exposures. Although resistant groups are found with molds as with bacteria, 90 per cent of the species tested were killed in one minute. It is apparent that if photochemical means could be shown to be effective in the destruction of molds on bread, this might prove very practical. In order to test the effectiveness of ultra-violet rays in the prevention of mold on bread, a large number of tests have been made since August, 1931, in the writer's laboratory. The mode of procedure was as follows: Loaves of bread were taken from the cooling racks and exposed to the light from a special National Carbon Co. lamp, which gave light of a wave length from 2,300-3,100 Angström units. The exposures were made for lengths of time varying from 30 seconds to 3 minutes. After the exposure, the loaves were wrapped in sterile paper and placed in the incubator. The results are shown in Table III.

From the above data it will be observed that there was an improvement in every instance as regards both decreased prevalence of mold on the treated loaves and concentration of the infection on those loaves showing mold.

Continuing the tests on sliced loaves and using a source of light richer than the previous ones in the short waves of light from 2,100 to 2,300 Angström units, we may summarize our results as given in Table IV.

The advantage of the treatment is strikingly shown here. And it seems evident that the exposure of bread as it is being wrapped would aid greatly in decreasing its mold infection. It should be remembered that, as far as the economic problem of moldy bread is concerned, any process that will prevent mold for four days is sufficiently complete to be considered entirely effective. Practically all bakery bread is consumed within this time. Most of it is consumed within the first 48 hours after manufacture and a great deal of it within 24 hours after it is produced.

In our tests, it should be remembered that the bread was exposed to the most drastic conditions both as regards temperature and humidity and it is scarcely conceivable that it would encounter such conditions with any frequency in actual practice. These conditions, however, were selected advisedly. We wished to induce mold formation as rapidly as possible in order to test the efficacy of the light treatment under very adverse conditions.

We have referred to the observations of Welch (*loc. cit.*) that there are resistant groups of molds, which are much more difficult to inactivate by ultra-violet rays than others. Of the different groups tested, the *Penicillia* were the most susceptible and the *Aspergilli* the most resistant to the treatment. Among the molds found by Herter and Fornet in moldy bread are *Aspergilli nidulans, glaucus, niger, candidus,* and *fumigatus; Penicillia glaucum, crustaceum,* and *olivaceum; Mucors pussilus, stolonifer* and *mucedo;* and *Monilia sitophila.*

The resistance of certain molds to light is attributed to the fatty or waxy coating which protects the mycelium from its effects, and it has been suggested that the greater ease in destroying molds in oils by light treatment may be due to the solvent action of the oil on this protective coating.

Under present conditions of manufacture the greatest source of mold contamination is at the bread slicer. It is here also that the utilization of the ultra-violet rays is most effective. There is no other means of applying a fungicide to the saws of the slicer than by the use of photo-therapy, and, unless it is applied, the saws continually take the mold spores from the surface into the interior of the loaf. It must be remembered that sliced bread has gained rapidly in popularity, and that it is also a far greater hazard as regards mold than the unsliced loaf. The first appearance of mold on unsliced bread usually is on the upper creases of the loaves, while in sliced bread it usually appears first in the crevices between the slices and on the crumb rather than on the crust of the loaf.

By applying a continuous fungicidal light upon the bread as it is being sliced we have found that we accomplish two purposes: sterilization of the slicer saws, and inactivation of the mold spores, as they fall upon the surface of the loaf. It is here that photocidal methods can effectively be used in the bakery, with a resulting decrease in losses from moldy bread and a corresponding increase in the purity of the daily output of the baking industry.

Table III—Effects of Ultra-Violet Rays on Mold Spores

Test No.	Time exposed	Wave length	Time required for mold development
1	30 sec.	2700-3000 A	4 days
2	Control	Control	48 hours
3	3 min.	2700-3000 A	3 days
4	3 min.	Control	24 hours
5	3 min.	2700-3000 A	4 days, 3 colonies
6	.....	Control	2 days, 12 colonies
7	3 min.	2700-3000 A	5 days, 0 colonies
8	Control	.....	5 colonies
9	3 min.	2700-3000 A	4 days, 3 colonies
10	Control	.....	2 days, 6 colonies

Table IV—Effect of Four-Minute Exposure by Ultra-Violet Rays

	Average number mold per slice	Per cent of slices Free from mold	Showing mold	Average No. of mold per slice infected
Control	2	25	75	2.6
Exposed	0.55	45	55	0.99

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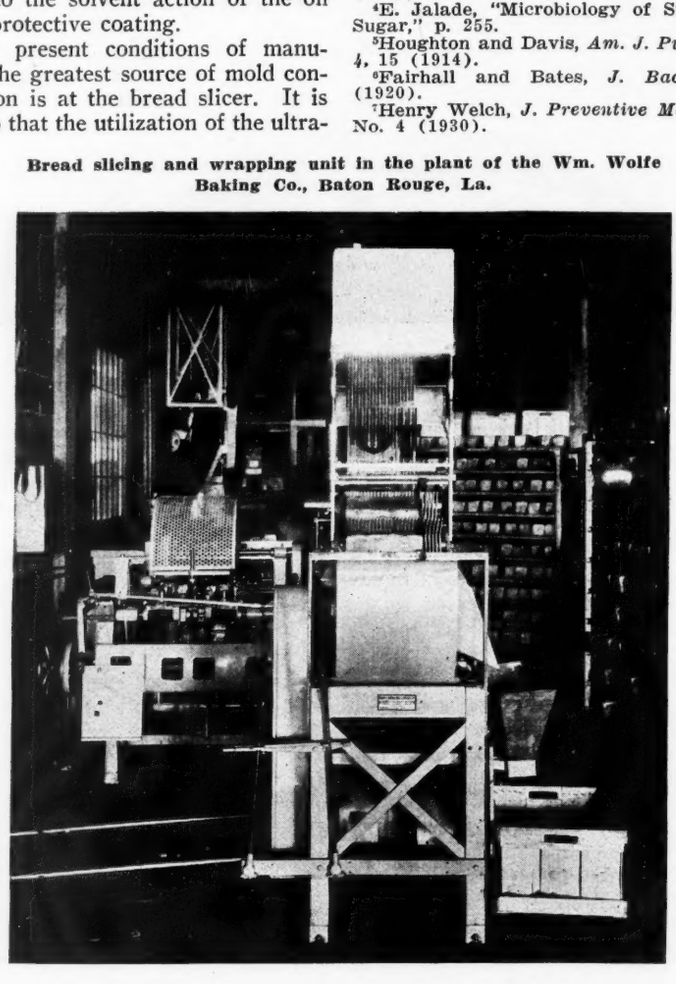
Bread slicing and wrapping unit in the plant of the Wm. Wolfe Baking Co., Baton Rouge, La.



Purity of Salt Important In Quality Pea Separation

By C. A. GREENLEAF
Research Laboratories
National Canners' Association

IT HAS BEEN KNOWN for a number of years that the use of hard water in canning peas is likely to cause a toughening of the skins of the peas. It is also generally known that this effect is due to the calcium compounds contained in hard water. Commercial salt also frequently contains calcium compounds, and if the quantity of calcium in the salt used for making canning brine is large, the brine has the same effect as that made from hard water.

The increasing use of quality separators, in which the peas pass through a strong salt brine for separation according to density, involves the purity of salt in a new connection. Here the question arises, "Is it possible for the peas to absorb calcium from this strong brine, and if so, what would be a proper standard of purity for the salt?"

It might be reasoned plausibly that if the salt contains a certain quantity of calcium, and that if the peas can absorb this calcium from a weak brine, a strong brine made from the same salt would impart much more calcium to the peas. As against this view, it might be urged that the peas are in the quality separator only a short time, and that not much could happen in that time. However, there is another aspect to the question, which furnishes a reason for predicting a different behavior for strong brine than for weak.

Action of Strong Brine

In their ability to absorb calcium from hard water, peas have been likened to the zeolites used as water softeners. When these zeolites have taken up as much calcium as possible, they are regenerated by passing strong brine through them. By extending the analogy, it might be predicted that peas would give up calcium to strong brine, rather than absorb it.

Some experimental work carried on in this laboratory throws light on this question. Small lots of peas were exposed to brine of the approximate density used in quality separators (specific gravity 1.12), and the effect on the quantity of calcium in the skins was determined by chemical analysis. Both raw and blanched peas were used, since gravity separation is applied under both conditions. In the first experiments, the peas were analyzed after treatment, without canning. Table I gives the quantity of calcium absorbed by the raw and by the blanched peas when they were treated with pure and with calciumized salts for different lengths of time.

It is evident from these results that strong brine made from pure salt has the property of extracting calcium from the skins of the peas; if the salt contains a moderate quantity of calcium, the extractive effect of the brine is diminished.

In order to observe the effect of larger quantities of calcium, the effect of brine separation on peas blanched in hard water, and whether the differences noted are apparent after canning, further lots of peas were put up in a commercial cannery. Here, a quality separator was in use on blanched peas; the experimental lots were treated in such a way as closely to simulate the action of the machine. After treatment, the experimental lots were canned and then analyzed. The results of the analyses are given in Table II. The hard water used for blanching was prepared by the addition of calcium chloride solution to the water supply of the plant.

It appears from these results that if the salt used in quality graders does not contain more than 1 per cent of calcium, no apprehension need be felt that the peas will absorb calcium from the brine. This is equivalent to saying that any salt of good commercial quality will do, since 1 per cent of calcium is a great deal more than is ordinarily found in such salt. From this viewpoint, the basis of specifications for salt is not quite the same for quality-grader brine as for canning brine, since the calcium content should be as low as possible in the latter.

On the other hand, brine made from pure salt seems to extract calcium very rapidly from the skins of either raw or blanched peas, and since calcium is associated with hardness, this is to be counted an advantage. From this viewpoint, it is desirable to use salt of the highest purity obtainable. This is especially true if the grading is done after blanching, when the extractive action of the brine is more rapid.

An additional reason for using pure salt in the quality separators is found in plants where the water supply is somewhat hard and the canner is reluctant to install softening equipment. In these circumstances, the extractive action of the pure brine can be turned to real advantage in diminishing the effect of the hard water.

Table I—Effect of Salt Brine on Calcium Content of Peas

Treatment	Calcium in skins (p.p.m.)*
Raw Peas (Temp. 82 Deg. F.)	
None	151
In brine made from pure salt	
After 30 sec.	140
After 1 min.	131
After 10 min.	90
In brine made from salt containing 0.3 per cent calcium	
After 30 sec.	141
After 1 min.	138
After 10 min.	131
Blanched Peas	
None	95
In brine made from pure salt; temp. 82 deg. F.	
After 30 sec.	80
After 1 min.	78
After 10 min.	58
In brine made from salt, containing 0.3 per cent calcium, temp. 82 deg. F.	
After 30 sec.	87
After 1 min.	86
After 10 min.	100
In brine made from salt, containing 0.3 per cent calcium, temp. 130 deg. F.	
After 30 sec.	90
After 1 min.	89
After 10 min.	107

*Parts per million.

Table II—Effect of Brine on Calcium Content of Peas Blanched in Hard and in Soft Water

Treatment	Calcium in skins (p.p.m.)* Peas blanched in soft water (89 p.p.m. calcium as carbonate)	Peas blanched in hard water (289 p.p.m. calcium as carbonate)
None	139	160
Brine treatment		
Pure salt	101	115
0.5 per cent calcium in salt	124	136
1.0 per cent calcium in salt	142	156

*Parts per million.

Adding Consumer Appeal To Fresh Foods

FOOD MANUFACTURERS have done much to add consumer appeal to their packaged goods, but, for the most part, fresh vegetables have had to depend upon their natural beauty to catch the eye of the shopper. "Dolling up" vegetables, however, to make them sell themselves on the shelf is being done with profitable results by some producers.

The kind of "beauty" treatment that these food men put their fresh produce through to make it attractive to the exacting housewife is exemplified in the Atlantic Commission Co.'s celery and tomato packing plant at the Pennsylvania Dock & Warehouse Co., Jersey City, N. J. This plant trims, washes, wraps and packs from 200 to 300 of the 90-lb. crates of celery each nine-hour day, and it sorts, ripens and packs about two carloads of tomatoes daily.

Nothing more or less than a vegetable washing machine is employed to give the celery that valuable makes-your-mouth-water kind of complexion. It is an all-metal device comprising a large-mesh, woven-wire conveyor about 35 ft. long and 41 in. wide, a water tank with a capacity of some 1,200 gallons, and sprays located at the middle of the machine, both above and below the conveyor. The sprays consist of 3-ft. lengths of pipe with a row of holes drilled in one side, and the water is forced through them to give the celery its "bath" by a single-stage centrifugal pump driven by a 5-hp. induction motor. The conveyor that takes the vegetables to and from their "bath house" receives power from a ½-hp. induction motor through speed-reducing gears.

Before subjecting the celery to the washing process, workers give it a preliminary dressing by lopping off the larger of the shoots to make the bunches conform to the housewife's idea of celery hearts. They also trim off part of the tops and cut the butts to the shape of a cone. About 30 girls work at trimming. Fifteen of them stand alongside the receiving end of the washer and the others work at boxes away from the machine. All these girls are supplied with stock by the men who carry the crates from the shipping room.

Sometimes the shoots trimmed from the bunches to make them dainty represent in themselves a small profit, but more often they are worth nothing—it depends entirely upon the current price of celery. When the price is sufficiently high, the company saves the best of the lopped-off celery and sells it as "soup celery." But when the price is down, so that no margin exists between the selling price and the cost of marketing, the trimmings become waste and are hauled to the dump. Two trucks handle this material, receiving their load from a chute into which a worker forks the waste as it collects on the floor around the trimming boxes. For convenience, the chute is located near the receiving end of the washing machine, the opening being in the wall at the floor level.

Workers at delivery end of washer wrapping the celery hearts and tying them in bunches for packing

Girls trimming celery and placing it on receiving end of washer. It then passes through a spray of water and is cleansed

As soon as the trimmers complete their part of the "beauty treatment" they place the bunches on the conveyor of the washer, distributing it evenly without any piling up. Traveling at a slow rate, it passes through the spray zone where the small, high-pressure streams of water strike it on all sides, taking off the dirt and foreign material and giving the celery a clean, fresh and attractive appearance. In the event any bunches pass through the bath without being thoroughly cleansed, a girl standing at the delivery end of the machine picks them out and gives them a hand scrubbing under a faucet.

As the celery reaches the delivery end of the washer, workers tie the smaller hearts into bunches of three and the larger ones into bunches of two and wrap them about the butt with a white,

waxed paper bearing the trade name "Fancy Celery." Then they tie six of these bunches together and place them in a wooden crate lined with oiled paper, about eight of the bundles being packed in one crate. Any of the individual bunches of celery that are too large to pass as hearts, even after being trimmed, go into separate crates and are marketed as stalk celery.

Ordinarily, the washer puts the celery through the bath fast enough to keep seven men busy tying by hand, with a girl tying on a small power machine. That number of binders necessitates the employment of six girls to do the wrapping and three men to work at crating the produce.

For the "cosmetic" used in adding consumer appeal to the celery, ordinary tap water has proved effective, the supply being changed twice daily. More frequent changing is avoided by the special design of the washer. A double screen set vertically in the tank catches the leaves that naturally collect in the water and provides a quick and easy means of removing them. A special flow arrangement directs the sand and other foreign material washed from the vegetables to one end of the tank, where it may be removed through a door opening into the side of the tank.

On the opposite side of the room from the celery washer is the tomato "beauty clinic." Here, a quite different method of culture is employed, it being the practice to cull out the vegetables that have the "it" known as consumer appeal and to refuse the others until they have made sufficient improvement.

About 30 girls stand along an 80-ft. conveyor belt and cast an appraising eye upon the tomatoes that have been dumped upon the belt from the shipper's crates. If the vegetables have the proper appetizing blush, they are selected by the "judges" standing on the left side of the belt and are packed in 10-lb. cardboard cartons. A second conveyor, a 70-ft. belt, located behind the inspectors and running parallel to the other belt, carries the cartons to a bench where one girl checks their weight and another closes the flaps and seals them with gummed tape.

Two groups of girls, each with different assignments, work on the right side of the inspection line-up. One picks out the tomatoes of the quasi-beauty type, those that are "turning," and the other looks for those that are perfectly green. They put their respective selections back into the wooden crates in which the tomatoes were shipped to the plant, and these crates go into the ripening rooms. There, under the influence of a 65-deg. F. temperature and a relative humidity of 85, maintained by unit heaters and humidifiers suspended from the ceiling, the green and turning tomatoes acquire a rosy tint that will get them past the inspectors.

The tomato packers are supplied with empty boxes from an overhead rack extending the length of the conveyor. Two girls keep this rack filled, setting up the cardboard boxes and stapling the bottom flaps on a power machine situated at the end of the rack. One girl sets up the "flats" and hands them to the other, who staples the flaps and places the boxes on the rack. Each time a new box is added to the supply the others are shoved along to fill up the empty spaces. The wooden crates used for the green and turning tomatoes are simply set on the rack after being emptied onto the conveyor belt.

Girls weighing and sealing cartons of tomatoes. Girl in background is stapling bottom flaps of set-up cartons

Looking down the line-up where the tomatoes are sorted and packed. The crates are emptied onto the conveyor at this end

Although the tomatoes come to the plant wrapped in paper, they are stripped before going through the inspection line-up. As they are emptied onto the conveying belt, two girls standing on either side of the emptying chute pull the wrappers loose. Then the tomatoes pass under a metal hood connected to the intake end of a blower pipe and the suction carries the papers into a wire-netting inclosure, or "cyclone," hung from the ceiling. When the cyclone becomes full, it is emptied into a baler which stands directly under it.

The New Jersey plant of the Atlantic Commission Co. has been in operation for about a year, and the demand for its "dolled up" products has shown a steady increase. Its original force of employees numbered 35, but now there is sufficient business to keep 100 busy.

While the plant had confined its work chiefly to adding consumer appeal to celery and tomatoes, with a small amount of processing having been done on brussels sprouts, its methods are clearly adaptable to other products.

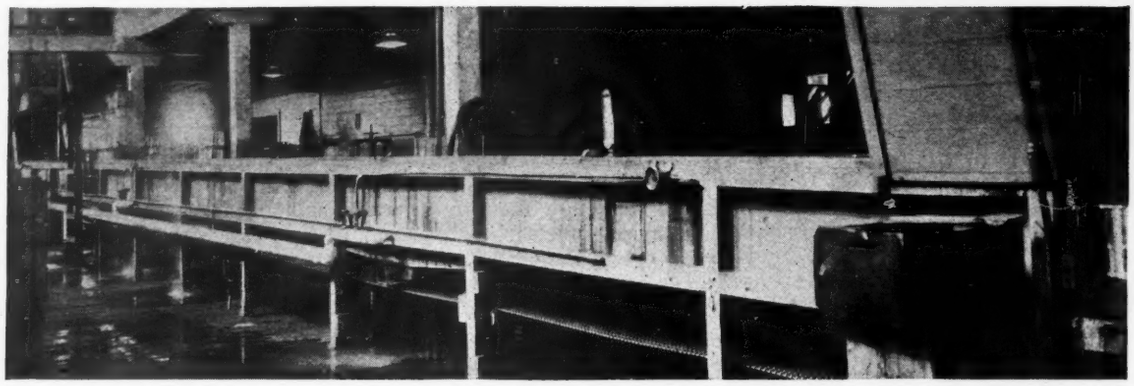


Fig. 1—An exhaust box, 71 ft. long, with three independent automatically controlled steam inlets

How the Canning Industry Uses Heat

Part II: The Exhaust Box

By ROBERT DILLMAN
Blue Island, Ill.

THE exhaust box in a canning plant is an important piece of equipment and very interesting to examine in a critical way from a scientific standpoint. It is called an exhaust box because it is supposed to exhaust the air from the contents of the cans. The equipment is simply a conveyor to take the cans through an atmosphere of steam in a long box and primarily it heats their contents, both in an indirect manner by live steam coming in contact with the outside of the can, and also in a direct manner by live steam condensing in contact with the contents exposed at the open can tops. Some actual exhausting of air does take place, but not a great deal in most cases, and it occurs only on tops and possibly along the sides of the can. The exhaust box is really a preheater which in some cases does a poor job of preheating but in others a very good one. What it really does is to warm up the contents, more or less, and heat the top so that some vapor is in the headspace instead of air, when it is sealed. Then after the can is cooked and subsequently cooled, it will have a partial vacuum which holds in the ends and prevents flippers.

Let us consider our old friend the tomato, packed in a No. 2½ can. Many canners use a 3-minute exhaust or less, and few go over 6 minutes. On solid-pack tomatoes with a 3-minute exhaust in a commercial exhaust box of the disk type, and with the initial temperature 85 deg. F., the can comes out *apparently* very hot. The top and sides are near the boiling point, but the center will not be much over 100 deg.; and, if mixed up uniformly, the temperature will be an average of about 110 to 120 deg. F. Surely this will drive out very little air. If the exhaust is doubled—i.e., six minutes—the center temperature is not much increased and the average will not be over 130 deg. These tests clearly show why a 3-minute exhaust will do for tomatoes, and why a long exhaust is a waste of equipment and steam for this product.

To get an idea of the thermal efficiency of the exhaust box on tomatoes I wrote to a manufacturer asking how much boiler horsepower would be necessary for its operation. According to him, it requires 15 to 20 boiler horsepower to give a 3-minute exhaust to 60 cans per minute. Approximately the following weights of materials and temperature rises are involved in our calculations if we disregard the solder and compound of the cans.

108.00 lb. tomatoes	raised 30 deg.
17.73 lb. steel	raised 127 deg.
0.27 lb. tin	raised 127 deg.

The tomatoes require 108 x 30 = 3,240 B.t.u. Steel, however, requires only 0.1165 B.t.u. to raise one pound one degree, and tin only 0.0562, so the total heat absorbed is 3,504 B.t.u. per minute, or 210,240 B.t.u. per hour. I have considered here that the can is heated to 212 deg. F. and, when the contents are mixed to get the average temperature, the extra heat of the can goes off in the air. This means that the horsepower actually absorbed by the cans is 210,240 ÷ 33,479, or about 6.3 hp. This means about 6.75 hp. at the boiler, and the efficiency will be approximately 35 to 45 per cent. This probably is fairly close to actual conditions in many canneries.

The above outline is true of tomatoes, but it does not apply to products of a different nature. Tomatoes do not allow circulation within the can, but such

products as cherries, berries, fruits, and pickles do permit circulation, and this changes the situation entirely. A 3-minute exhaust is not sufficient for these products for various reasons. With more or less free circulation of juice the condition of hot surfaces and cool centers is not possible, and the contents are heated more uniformly. The added syrup, brine, or water has a tendency to carry some air with it, but if it is added hot, this is at a minimum. Many of these products have a great tendency to attack the can and cause perforations and hydrogen swells, a condition often aggravated by the presence of air in the can. All of these things call for a longer exhaust and higher average sealing temperature.

As an illustration of this class of product let us examine dill pickles in No. 2½ cans. If cans of pickles at ordinary temperature are filled with brine testing 190 deg. F., the average temperature when they enter the exhaust box will be about 110 deg. F. After ten minutes in an ordinary exhaust box the brine will be between 175 and 180 deg. in the center of the can and the pickles will be around 120 deg. in the center. This last temperature varies with the size of pickle. The final package will average about 160 deg., making a temperature rise of 50 deg. Qur schedule of temperature changes is then as follows:

108.00 lb. contents	raised 50 deg.
17.73 lb. steel	raised 62 deg.
0.27 lb. tin	raised 62 deg.

The temperature of the can will be about 150 deg. as it enters the exhaust, so its temperature rise is from 150 to 212 deg., or 62 deg. This makes a heat absorption of 5,529 B.t.u. per minute, or 331,740 B.t.u. per hour. This is about 10 hp., at the exhaust box or equivalent to 10.7 hp. at the boiler for the actual heat absorbed. The efficiency will be a little better than the smaller exhaust box previously described. The horsepower at the boiler will be about 25 and the efficiency about 40 to 45 per cent.

From this it will be seen that a 10-minute exhaust on pickles requires only about 25 per cent more steam than a 3-minute exhaust on tomatoes. It will also be seen that the character of the product and its initial temperature, as well as the length of the exhaust, affect the steam consumption very much.

The foregoing examples are meant simply to give the method of calculating heat required for an exhaust box, but there are so many kinds in use and they are operated at such widely different efficiencies that each case must be analyzed by itself.

It is interesting to review the development of the exhaust box. The early exhaust box was a simple belt of some sort going through a steam chamber. It was quite short and the amount of heating done was very small. To do much heating it would have had to be extremely long, so a series of parallel conveyors was next developed, and one single conveyor chain furnished the means of conveying the cans. The chain usually was a type of link belt running on edge with diamond-shaped plates attached to the links, thus forming the conveyor. The trouble with this was that it was never designed of sufficient strength to perform its duty. The chain was constantly breaking and causing endless trouble. To overcome this a cable was substituted for the chain and cable exhaust boxes became quite popular on the Pacific coast. Again, however, the construction was not strong enough to do the job, and cables would break and cause much trouble.

The disk type exhaust box next followed, and proved to be the most dependable. It consists of a series of revolving disks with gear teeth on the edges so that each one drives the next one and it becomes a chain of flat, horizontal gears. The cans are guided from one disk to the next by a series of guides which form the path of the can. The original disk exhaust was a spread-out affair with quite large disks and took up much space for its capacity. It was a big steam user, and was poorly designed. The present highly developed disk exhaust box has smaller disks, is more compact, and is one of the most dependable pieces of canning equipment on the market. The Peerless circular exhaust consists of a set of concentric rings revolving in alternate directions with guides to transfer the cans from one to the other. This is a very dependable piece of equipment and is as economical of steam as any on the market.

The hot-water exhaust box was first tried out about fifteen years ago and great things were expected of it. In the ordinary steam box the product on top of the can is subjected to contact with the hot steam during the entire trip through it. With cans immersed in hot water as the heating medium this is not the case, for the heating is done from the bottom and side. The new method of heating was expected to improve the quality of the product on top of the can. The first hot-water exhaust boxes were more efficient than the steam boxes they replaced, and better results were obtained by their use. I believe, however, that, generally speaking, a well-designed steam exhaust box is much better than a hot-water exhaust box because it will heat faster, is more efficient, gives less trouble, and because the expected superior quality of the top product does not materialize in most cases where a hot-water exhaust is used.

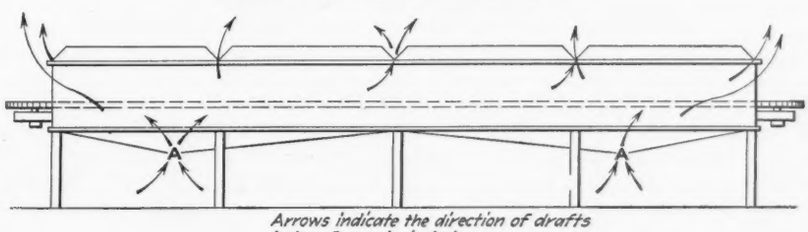
A number of mechanical suggestions for moving cans through an exhaust box have been made. The complicated ones are not received with favor, but I am not attempting to cover them all in this article. Simplicity, ease of operation and repair, dependability, and foolproofness are the main things required in exhaust boxes as viewed from a mechanical standpoint.

If we review the exhaust box from a heating standpoint, we find many interesting things. Only the steam coming in contact with the cans does any good; that which goes out the ends or past the covers is waste. Confined steam is desired and therefore ventilation is obviously a very bad thing, yet in many exhaust boxes in use we find fairly good ventilation and only part of the surface of the cans being heated. Consider the box shown in Fig. 2, which is an ordinary exhaust box with two holes in the bottom to let out the condensed steam and any overflow from the cans. The covers are not water-sealed. Since steam is lighter than air, an upward draft is created and air enters the bottom and lets the steam out the top. This exhaust box will not heat well unless enough steam is turned on so that its expansion will keep the air out of the bottom and supply all the steam leaks on top. This box requires a great deal of steam and fills the room with vapor.

Some exhaust boxes are now made with water-sealed tops which help greatly, but only partially correct the trouble. The bottom drains also should be water-sealed and the whole box made steam tight except for the inlet and outlet conveyors for the cans. Steam consumption will then be reduced very greatly. In operating a box designed in this manner, it is necessary to have only enough steam turned on to provide a little vapor at the inlet and outlet openings to be sure that it is full of steam.

Now let us consider the heating of the cans in the exhaust box. The best place to apply heat is on the bottom,

Fig. 2—In the common form of exhauster the steam has a tendency to escape upward and allow cold air to enter through the drain openings, thus wasting heat



Arrows indicate the direction of drafts
A.A = Open drain holes

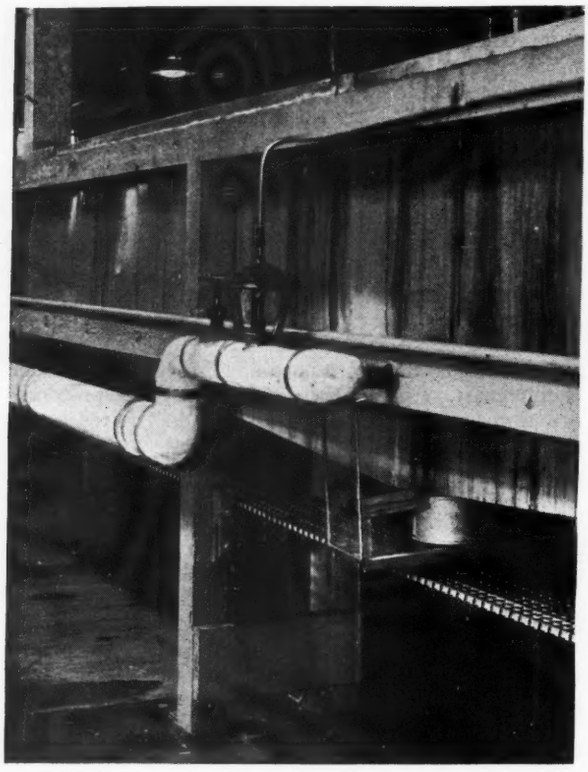


Fig. 3—The water-sealed drainage outlet eliminates the possibility of cold air entering the 71-ft. exhauster

especially for products such as fruit in syrup, pickles, and other products which allow convection currents to take place. For products like solid-pack tomatoes, where no currents develop, it is still a good thing to heat the can all over, as this makes a better vacuum in the finished can and also tends to decrease the necessary sterilizing process afterward. The disks in a regular disk exhaust box allow very little heating from the bottom. The same is true of the plates in a Peerless exhauster. The old cable exhaust was fairly good as a bottom heater, as were some designs of chain exhausters. The best type at present is the "doormat" type of metallic conveyor belt with all the steam pipes located underneath with holes pointing up so the steam hits the bottoms of the cans directly. Each pipe should have a couple of holes on the bottom, however, to let the condensation out.

An exhaust box recently built, combining all the points covered above, shown in Fig. 3, illustrates the type of water seal on the drain openings. Fig. 1 shows a view of this completed box. This is a single-run exhauster, 71 ft. long, and when running on dill pickles it will accomplish in three minutes what the ordinary disk exhaust box previously used accomplished in ten. An actual test of this box under load using a flow meter in the boiler room to measure steam showed 13 boiler horsepower supplied and an efficiency of 72½ per cent. This is by far the most efficient and fastest heating exhaust box we have ever seen. This long, narrow box fits into the line-up of the particular installation very well, but it would not fit in the ordinary cannery line-up. It demonstrates the principles outlined above in a practical manner, however, and some of the points involved can be applied to ordinary exhaust boxes.

The question of temperature controls on exhaust boxes has been discussed many times. The fact that saturated steam at atmospheric pressure is 212 deg. F. (or less, according to the barometric pressure at the particular location) makes controls inoperative on ordinary exhausters. On the single-run long box referred to three controls were installed. The perforated steam pipes under the conveyor belt were divided into three equal sections, one at each end and one in the middle. Each section has its individual controller and thermometer. The two end controllers are about 6 ft. from each end and the third one is in the center. They are all set a few degrees below the boiling point.

At the start of a run the steam is turned on and the box heated up. As soon as the air is driven out the controls all shut off automatically and only slight spurts of steam are emitted to keep the temperature up. When cool cans enter, the steam turns on in the first section very quickly. It then turns on and off constantly as long as cans are entering the box, but as soon as there is a break in the line of cans fed in, the steam turns off. The controller of the center section turns on very seldom, for any condensation of steam in the center tends to create a vacuum which draws steam from the ends, thus keeping the center temperature up. The third section turns on slightly, but much less than the inlet end. This system works very well on the special box in question but it will not work on the usual commercial equipment.

Part III of Mr. Dillman's article, covering the heat technology of sterilization, will appear in July.

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World Sugar Output Declines Sharply

The current sugar season probably will show some depletion in the large visible stocks that have been accumulating rapidly the last few years, says the U. S. Department of Agriculture, reporting on the world sugar situation. The Bureau of Agricultural Economics estimates world beet and cane sugar production in 1931-32 at 28,752,000 short tons, a decrease of 3,225,000 tons from the preceding year. This was the smallest crop since 1927-28. Practically all European beet-sugar producing countries except Russia expect smaller acreages in 1932 than in 1931; and cane sugar countries, adherent to the International Sugar Restriction Agreement, are planning to continue limiting production as in 1931-32. These countries accounted for about 40 per cent of the world's 1929-30 cane sugar crop.

Decrease in world production this season is accounted for almost entirely by the nine countries—Germany, Czechoslovakia, Poland, Hungary, Belgium, Jugoslavia, Cuba, Java, and Peru—which are parties to the International Sugar Agreement. All with the exception of Jugoslavia are important sugar exporting countries. Total 1931-32 production in these countries is estimated at 9,848,564 short tons, compared with 12,712,286 tons in 1930-31. Germany shows the greatest decrease, with a 1931-32 crop placed at 1,734,200 short tons, compared with 2,808,076 the preceding season.

The 1931-32 sugar season opened with the heaviest accumulation of visible world sugar stocks on record, but that "with the indicated decrease in sugar production in 1931-32 it seems likely that stocks will be considerably reduced by the end of the season, if exports do not fall below the indicated quota."

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A Correction

In the article by Allan P. Colburn, entitled, "What Heat-Transfer Theory Tells in the Food Plant," appearing on page 155 of May, 1932, FOOD INDUSTRIES, the author reports an error in formula (2) which deals with the flow of heat through insulation on pipes. The formula should read:

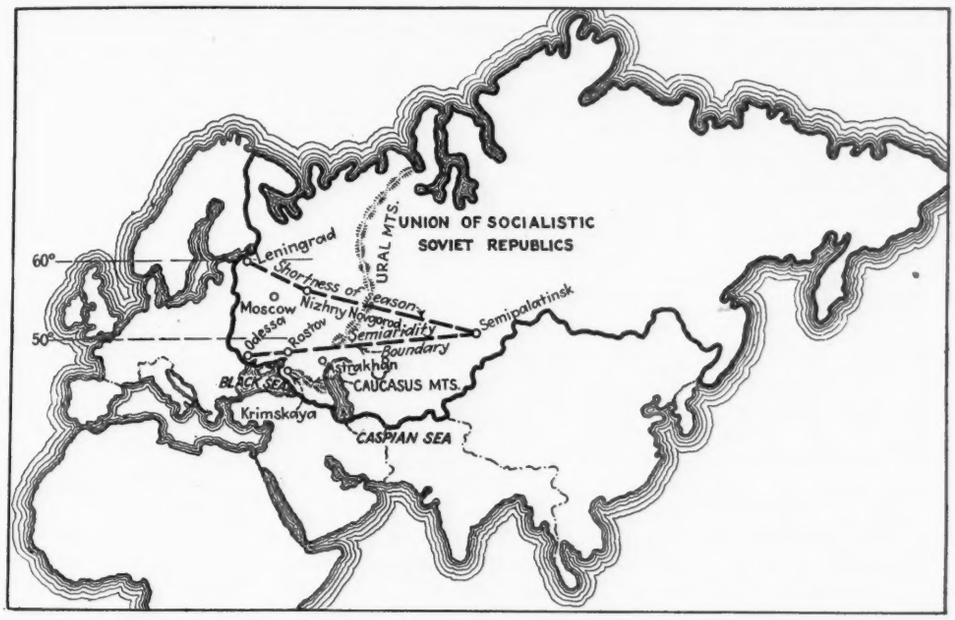
$$\frac{q}{\theta} = \frac{2\pi k\,(t_2 - t_1)\,L}{2.3 \log\left(\frac{Do}{Di}\right)}$$

Russia Unlikely to Be a Serious Agricultural Competitor

A worried world wonders what will happen when Russia gets into production, fearing that it will be swamped with agricultural commodities. Read what an experienced geographer found in Russia in 1931. It's short and to the point. Recall that Russia is experimenting futilely with artificial rain production. Would the Russians attempt it if they had plenty of rain?

By W. ELMER EKBLAW

Professor of Geography
Clark University,
Worcester, Mass.



The vast territory of the U.S.S.R. dominates the map of Europe and Asia

THE greater part of Russia's 160,000,000 of peoples lives within a relatively limited triangle, of which the base abuts upon western Europe and the apex lies near Semipalatinsk, and embraces only 15 per cent of its 8,000,000 square miles of area. Only a part of the triangle is arable, and its boundaries are so inexorably set by natural conditions that man cannot appreciably extend them economically. The northern boundary is fixed by the brevity of the growing season, the southern by the inadequacy and irregularity of the rainfall over any decade of years—physical limitations that man cannot transcend except by exceedingly costly methods.

Little expansion of crop agriculture is possible, for the arable lands of this triangle are fully utilized and densely populated at present, and the boundaries of the triangle cannot be extended. Irrigation development, except at excessive cost, is likewise not possible over much of Russia's great territory because of low precipitation and low relief. Where irrigation is practicable, as on the slopes and at the foot of the Caucasus, Thian Shan, and Hindu Kush, either the available water has already been utilized for centuries or else the soil is too alkaline for successful crop production.

Russia's population is increasing (according to Soviet data) from three to three and a half million annually. The excess of births over deaths per thousand per year is reported to be 24.3, almost double that of Italy, three times that of Germany, four times that of Britain, and ten times that of France. With an ever rapidly growing population confined to a limited area beyond which expansion is faced by insuperable obstacles; with a paucity of mineral resources available or accessible; with practically no access to the open seas, to the North Atlantic major theater of man's maritime activities; with little or no racial, religious, or linguistic unity; with utterly inadequate transportation by rail or highway; with retarded cultural status; with all these handicaps, Russia is not likely to become a serious competitor to the United States or western Europe agriculturally, commercially, or industrially!

Prof. Ekblaw has recently returned from an intensive study of the geography of Russia at first hand.—THE EDITOR.

Steering Clear of Mapes Law Violations

BECAUSE Congress, in passing the McNary-Mapes amendment, did not vote any increased appropriation to the Food and Drug Administration for personnel or equipment, the work done since it went into effect a year ago necessarily has been limited. So far, it has been possible to establish standards for only six of the most common foods, and it is extremely doubtful that further standards will be promulgated in the immediate future. For the same reason, inspection work has been limited, although, up to Dec. 15, 1931, eighteen seizures were made.

Consumer Interest Rules

In the provisions of the act, it is significant that the phrase, "honesty and fair dealing in the interest of the consumer" appears twice. Failure to remember this fact has often been the cause of criticism of the Administration when an opinion is given or action taken which seems to be more drastic than at first thought might seem warranted. In securing this legislation, canners recognized that the interest of the consumer is paramount.

There exists a mistaken opinion in some quarters that the amendment classes as substandard foods previously classed as illegal. As a matter of fact, foods which were illegal before are still illegal. Canned foods which contain excessive brine, for instance, cannot be legalized by labeling them substandard.

The amendment has added one very important feature to the law which many have failed to notice. It gives the Secretary of Agriculture power to prescribe the *fill of container.* The standard for fill of container reads as follows: "Canned foods shall be considered as of standard fill if the entire contents occupy 90 per cent or more of the volume of the closed container." This requirement now applies to all canned goods defined by the act, even though quality standards for them have not been announced. If not properly filled, they must bear the substandard legend, "Slack Filled."

A quick method of ascertaining approximately the proper fill of cans is as follows: Measure the total outside height of the sealed cans and express the result in sixteenths of an inch. Subtract from that result $\frac{4}{16}$ allowance for the top and bottom seams. Then 10 per cent of the result, plus $\frac{2}{16}$, will be the allowable headspace from the top of the opened can.

In setting standards for each product, the Administration has endeavored to use terms and definitions which are exact and capable of the same interpretation by anyone, so that there may be no misunderstanding as to their intended meaning. This has been a difficult task because the amendment says that standards must be for each generic class of product, and not varieties or species. Although accurate measurements of such qualities as texture and color are necessary for court actions on goods close to the line, the devices invented for this purpose are not complicated. They may be easily used by anyone after a small amount of experience. In most cases, it is unnecessary to resort to actual measurements. The expert examiner, or the cannery superintendent accustomed to judging qualities of canned goods, can readily determine these qualities quite closely by the feeling or appearance.

Definite Grades Needed

Our advice is to grade products so that they will be unmistakably below or above the line. The place to do the grading is in the cannery at the time of packing. It is too late when the goods are in the warehouse or in buyers' hands. When it is found by cutting samples, or examining the fruit in the cannery, that some cans are getting too close to the line, then it is the time to have sorters or graders immediately change their yardstick.

We have been asked what tolerance will be allowed in examination of samples. For instance, if, in a twelve-can sample, ten of the cans are standard and two are substandard, would the whole lot be declared substandard? It is impossible to answer this question in a general way. Each such case must be considered on its individual merits, and we will be guided by common sense. We certainly will not recognize as legitimate the deliberate mixing of substandard cans with an otherwise standard lot. Let me also give assurance that actions will be based in all cases on adequate representative samples, and not on single cans. We have been asked whether the term "packed in water" may be used in place of the term "water pack." The Administration has announced that either term will be satisfactory.

There have been numerous requests to permit alternative forms of descriptive labeling of one sort or another on products which fail to meet the standard in certain respects, but it is our belief that a multiplication of exceptions is undesirable and likely to produce more confusion and misunderstanding than the uniform use of the substandard labeling. It is only on specialty products of obviously high quality, such as diced peaches, for example, that we have ruled administratively that the descriptive term was more suitable than the substandard legend.

It is quite a common practice to ship, from canner to wholesaler or retailer, unlabeled canned goods which the receiver will subsequently label. It has been asked if such shipments of substandard goods should bear the legend on the cans or on the cases. The Administration has announced that the substandard legend must appear on the cans and on the cases. On the cases, it is not necessary that the legend be in the prescribed form with the black border, but it should be in letters of sufficient size to be plain and conspicuous, and should be at least as large as the type for the 5-lb. can. In lieu of that, the can label may be pasted on the outside of the case. Cans should also bear the net weight statement.

Export Labels

Quite a large proportion of the canned pears packed in this territory are exported to foreign countries, and several packers have asked for information on this subject. The Food and Drugs Act provides that no article shall be deemed adulterated or misbranded within the meaning of this act when intended for export to any foreign country, and *prepared or packed according to the specifications or directions of the foreign purchaser,* when no substance is used in the preparation or packing thereof in conflict with the laws of the foreign country to which it is intended to be shipped. The Administration holds that to comply with this proviso it is necessary for the exporter to have specifications or directions from foreign purchasers stipulating that the cans do not bear the substandard label. Substandard goods not so labeled must bear the statement "For Export."

In conclusion, I should like to call attention to the matter of proper labeling for net weight. The regulations provide that an article of food in package form shall be considered to be misbranded if the quantity of the contents be not *plainly* and *conspicuously* marked on the outside of the package in terms of weight, measure, or numerical count. Many manufacturers have gone far away from the plain requirements. We find many labels which have to be scrutinized very carefully to find the net-weight statement. Let me appeal to you to cooperate with us by correcting this fault on your labels.

*Abstracted from a talk by H. C. Moore, chief, Seattle division, U. S. Food and Drug Administration, before the Northwest Canners' Association Convention at Seattle, Wash., Jan. 6, 1932.

ABSTRACTS OF CURRENT LITERATURE

SALT AS A CONTROL OF BACTERIAL DECOMPOSITION OF HALIBUT. Robert H. Bedford. *Bulletin XXIX, Fisheries Experimental Station* (Pacific). The Biological Board of Canada, 16 pp.; 1932.

The yellow discoloration of halibut, caused by *Ps. fluorescens* (see FOOD INDUSTRIES, April, 1929, page 308), cannot be prevented by using sterile ice because of recontamination by men, ships, implements, and water. Immersion of the eviscerated halibut in 20 per cent sodium chloride brine for 30 minutes, followed by stowing in cracked ice, is found to reduce the bacterial numbers and prevent all discoloration. Salt penetration is only superficial and after unloading at port is found to be negligible. Much of it washes away by the melting ice. Treatment of 5,850 lb. of fish required 300 lb. of salt, including the quantity to make up fresh brine. As a result of the brine treatment the fish loses some of its bloom, or "life," due to coagulation of the slime, and the poke loses some of its redness. Both of these characteristics have been regarded by the trade as of significance in determining freshness of the fish by inspection.

* * *

CHEESE SPREADS. Hugh L. Templeton and H. H. Sommer. *Journal of Dairy Science*, Vol. 15, pp. 155-62; March, 1932.

The spreading qualities of cheese spreads may be due to their moisture or fat content, or to a combination of these factors. With high moisture and relatively low fat content, the texture is mealy, becoming like that of butter as the fat content is increased. If both the fat and moisture contents are high, the spread is so soft that it has an unappetizing appearance. Comparatively high temperatures must be used in the manufacture of cheese spreads because of the high moisture content, the low acid reaction, and—where cream is used—the presence of putrefactive organisms. The keeping quality of cheese spread is affected by its acidity, satisfactory values being pH 5.8 to 6.1. If old cheese is used in the process, or if the texture of the products tends to become coarse for other reasons, a smooth texture may be produced by running the hot cheese mass through a mustard or paint mill or through a homogenizer. A method of calculating the quantities of the different ingredients to be used in cheese spreads is given, with samples of their application.

* * *

CRYSTALLIZED VITAMIN D. A Windaus and others. *Liebig's Annalen*, Vol. 489, pp. 252-269 (1931). [*Nutrition Abstracts and Reviews*, Vol. 1, p. 434; January, 1932.]

Successful isolation of crystalline preparations of vitamins D_1 and D_2 from the products of irradiation of ergosterol has been accomplished. These purified materials possess different melting points and different chemical properties, but both are highly active anti-rachitically and show the usual toxicity in large doses.

TRENDS IN ICE CREAM COSTS. Special Bulletin No. 34, International Association of Ice Cream Manufacturers. (Price, $1.)

With the experience of 88 companies as a basis, the cost of marketing ice cream is analyzed and the percentage of the total cost computed for each step. Average costs are given for each of eight districts into which the United States is divided and the trend in cost is shown for the past six years. Average costs afford an efficiency basis for manufacturers.

* * *

REPORT OF OPERATION OF STATE TESTING MILL, CROP SEASON OF 1930. By H. A. Halvorson, Director. Bulletin No. 7, Minnesota Department of Agriculture, Dairy and Food.

Test data on 52 car lots of wheat from Minnesota, North Dakota, and South Dakota, including flour yield, protein content, baking characteristics, and ash results are given in the report.

* * *

CALCULATIONS FOR DRYING. M. Tomlinson. *Heating, Piping and Air Conditioning*, Vol. 4, pp. 276-280; April, 1932.

The author shows how the quantity of heat required for drying a product is calculated. Two typical examples are worked out to indicate the manner in which such computations may be made. To meet the need for solving high-temperature drying problems easily, four additional charts on air-water-vapor volumes and moisture content, and heat content of dry air are given.

* * *

NERVOUSNESS IN SCHOOL CHILDREN AS RELATED TO HUNGER AND DIET. By Donald A. Laird, Michael Levitan, and Virginia A. Wilson. *Medical Journal and Record*, Vol. 134, No. 10, pp. 494-499; Nov. 18, 1931.

The report points out that special feedings of milk between the first two meals of the day, and special feedings of a food concentrate are effective in alleviating nervousness of children.

* * *

WATER CONTENT OF BUTTER. M. Otte. *Milchwirtschaft. Forsch.*, Vol. 11, pp. 537-576 (1931). [From *Chemical Abstracts*, Vol. 26, p. 778; Feb. 10, 1932.]

The moisture increases as the size of the fat particle increases; it also decreases with surface. The moisture content of unwashed butter increases with the acidity, but after washing decreases. The moisture content decreases with the time of holding the cream at a low temperature. Increased salt content decreases the moisture. Working gradually decreases the moisture but excessive working increases it. Many factors in churning influence the adhesion. The temperature of water and the salt content influence this property. Summer fat shows a greater adhesion than winter fat.

THE ROLE OF ACIDITY IN FOOD PRESERVATION. W. V. Cruess. *Food Manufacture*, Vol. 7, pp. 115-19; April, 1932.

By acidifying the brines used in canning non-acid vegetables, or by blanching such vegetables in dilute acid, the products can be sterilized at 212 deg. F. Non-acidified products, however, require heating under steam pressure at 240 to 250 deg. F., temperatures which adversely affect the flavor and prohibit the use of open processors. Apparently, the critical final pH value is about 4.8, and for values above that a process temperature of 212 deg. F. cannot safely be used. It is recommended that the method be employed only under the strict supervision of a well-trained chemist or bacteriologist, owing to the danger of poisoning from *Bacillus botulinus* toxin that might develop in vegetables not properly handled. A comprehensive explanation of the meaning of pH value is given.

* * *

ON ROPE CONTROL OF BREAD. H. H. Bunzell and M. Kenyon. *Cereal Chemistry*, Vol. 9, pp. 161-168; March, 1932.

A method has already been described for recognizing ropiness of bread in its very early stages, when such ropiness could not be detected by the ordinary methods. The authors have improved their catalase method for determination of the degree of infection of bread by the use of 6 N. hydrogen peroxide and an incubation temperature of 40 deg. C. With these modifications of the original method it is possible to complete a determination within 16½ hours after receipt of the sample.

* * *

THE CAUSES OF CURDLED APPEARANCE IN ICE CREAM WHEN MELTING. J. H. Erb. *Ice Cream Trade Journal*, Vol. 27, pp. 43-4 (1931). [From *Chemical Abstracts*, Vol. 26, p. 1039; Feb. 20, 1932.]

The fundamental cause of the curdled or flaky condition exhibited by some ice cream when it melts down is a destabilized protein. Factors contributing to this undesirable melting down are: excess of soluble calcium salts in the mix serum, low pasteurizing temperature, high acidity of the mix coupled with high pressures of homogenization, low serum solids to fat ratio in the mix, and low temperature of homogenization. The curdled appearance of melted ice cream can be remedied by the addition of a small quantity (0.1 to 0.2 per cent) of sodium citrate or di-sodium phosphate to the mix prior to homogenization.

* * *

NEW METHOD FOR THE PURIFICATION OF BEET AND CANE SUGAR JUICES. J. Zamaron. *Bull. assoc. chim. sucr. dist.*, Vol. 48, pp. 277-87 (1931). [From *Chemical Abstracts*, Vol. 26, p. 1148; Feb. 20, 1932.]

Laboratory tests led to the recommendation to treat raw juice with 0.25 to 0.3 per cent of lime and 1 per cent of an aluminum hydroxide paste containing some 6 per cent aluminum hydroxide in water. This is heated to 85 deg. C., where rapid settling occurs, and is then filtered. The filtered juice is treated with 0.4 to 0.5 per cent of lime and 0.1 to 0.15 per cent barium hydroxide, carbonated once, filtered and evaporated. Good clarification is claimed for beet juice.

BOOK REVIEWS

OFFICIAL AND TENTATIVE METHODS OF ANALYSIS. Third Edition. Published by Association of Official Agricultural Chemists, Washington, D. C., 1930. 593 pp., 6½x9½; 36 figures; cloth. Price, domestic, $5; foreign, $5.50.

METHODS compiled in this authoritative analytical guide receive official recognition only after a great amount of collaborative research work. They are designated by the wording of state and federal pure food laws as being the basis upon which foods and agricultural products shall be examined. In the commercial field each control and research laboratory is so prone to have its own analytical methods and procedure that comparative results or referee work would be almost impossible without a standard and authoritatively recognized reference book of this kind.

Compilations of these official and tentative methods, which have appeared at five-year intervals since 1920, have been more inclusive with each edition. This edition is not only more inclusive but is improved by the grouping of chapters into food and non-food classifications and the placing of chapter numbers at the top and page numbers at the bottom of each page. Methods pertaining to food examination have been grouped in successive chapter headings arranged in alphabetical order and under logical groupings to make reference easier. In the chapter entitled "Cereal Foods" this edition gives recognition to the experimental baking test as a tentative method for testing flours.

Of special interest to the food chemist is the first inclusion of methods for analyzing eggs, egg products, and the radio-activity of foods. Chapter headings have been given to Fish and Other Marine Products, Nuts and Nut Products, Vitamins, Bacteriological Methods, and Microchemical Methods, which are indicative of new material of interest to food chemists that is to be included in future editions.

As usual, the appendix contains a collection of reference tables dealing especially with sugars, alcohol, watered milk, and carbon dioxide.

* * *

THE LAW OF PATENTS FOR CHEMISTS. By Joseph Rossman. Published by The Inventors Publishing Co., Washington, D. C., 1932. 304 pp., 6x8½; cloth. Price, $3.50.

AS PATENT examiner in the chemical division of the U. S. Patent Office and member of the Bar of the U. S. Court of Customs and Patent Appeals and of the U. S. Supreme Court, the author writes with authority in a comprehensive yet non-technical manner for chemists interested in protecting their inventions. Food chemists and research workers, almost equally involved in patent matters, will find the information given in this book as applicable to them as to the chemical industry chemists, for which it is ostensibly written. Examples of typical chemical patents and of a completely prosecuted chemical patent application, a glossary of legal patent terms, and a selected bibliography of books and periodical articles on patents and patent law give the book a completeness that adds to its utility.

Among the points expertly dealt with are: What a chemist should do when he makes an invention; how he can legally protect his rights; what procedure to follow, precautions to take, preparation to make, and filing of application to get patent rights; how patent rights are finally obtained; and how to dispose of or enforce his patent rights.

* * *

BIBLIOGRAPHY OF BIBLIOGRAPHIES ON CHEMISTRY AND CHEMICAL TECHNOLOGY. Compiled by Clarence J. West and D. D. Berolzheimer. Published by The National Research Council of The National Academy of Sciences, Washington, D. C., March, 1932. 150 pp., 6¾x9¾; paper. Price, $1.50.

THIS compilation, the third bulletin on these compilations, is known as Second Supplement (No. 86), covers the period 1929-31, and contains approximately 3,300 bibliographies under 950 headings.

Among the bibliographies of importance to the food chemist and technologist are: amylases and enzymes (39); carbohydrates and sugars (51); fats, oils, and waxes (35); foods and general foodstuffs (116); milk (44); and water (33). Those on biochemistry (32); colloids (30); fertilizers (34); hormones (31); metabolism (72); plant chemistry (39); soils (76); and vitamins (41) are of more than passing interest. Each bibliographic entry includes author or compiler, title, where and when published. Each is classified in alphabetical order under subject headings.

The original bulletin (No. 50) covers the period 1900-1924; the first supplement bulletin (No. 71) includes 1924-1928. Each contains a compilation of bibliographies published as such or included at the end of books, magazine articles, or as footnotes in books and magazines.

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AUSTRALIAN AND NEW ZEALAND FRUIT SHIPMENTS—Report No. 46 (November, 1931) by the Economic Section of the Empire Marketing Board. Published by His Majesty's Stationery Office, Adastral House, Kingsway, London, W. C. 2. 68 pp., 7⅞x9¾. 5 figures, 20 tables; paper. Price, 30 cents plus postage.

APPLES and pears from Tasmania, Western Australia, Victoria, South Australia, New South Wales, and New Zealand were the subjects of this investigation into the deterioration of fruit in transit, which may be obtained from the British Library of Information, 270 Madison Ave., New York, N. Y. The report covers the years 1927-1930.

Overripeness, fungal rotting, internal breakdown, and bitter pit constituted the cause of wastage in apples. Fungal rotting and internal breakdown develop after the fruit has been removed from the refrigerated hold. Internal breakdown appears to be associated with too low temperature during shipment and in some varieties to late harvesting.

Bitter pit develops more extensively in early than in late picked apples and has reached full stage by the time shipments reach their destination. Large-sized fruit is more susceptible to internal breakdown and bitter pit than the small-sized.

Loss in pears is due largely to over-ripeness and, as in apples, is the result of too high temperatures in the hold.

* * *

MARKETS BY INCOMES. Published by Time, Inc., 125 East 42d St., New York, N. Y., 1932. 78 pp., 8⅜x12; board.

AN IMPORTANT fundamental market research in Appleton, Wis., involving the buying of one family in every six whose income figures are taken from sworn income tax statements. Reports from housewives and dealers were segregated into income groups and the average purchases per 1,000 families were computed and graphically charted.

The grocery section makes up approximately one-third of this report and shows the effect of income on retail sales. Included is an analysis of quantity and brand of products purchased by the different income groups.

* * *

THE EFFECT OF DISPLAY ON THE SALE OF GROCERY PRODUCTS. Published by *The Progressive Grocer*, 79 Madison Ave., New York, N. Y., 1932. 16 pp., 8⅜x11; paper.

MANUFACTURERS of food products who are actively interested in following their products through retail outlets will find this booklet highly instructive. Two different groups of products in 54 and 58 stores respectively were put on sales test over a two-weeks' period. The first week's study was made with them in their accustomed locations. During the second week they were put in display locations. The second week showed a 43.5-per cent average increase in sales. One product had an average increase of 72.7 per cent. The lowest average increase was 32 per cent.

* * *

NATIONAL DIRECTORY OF COMMODITY SPECIFICATIONS. Bureau of Standards, Miscellaneous Publication No. 130. 550 pp. Price, $1.75. (Orders should be addressed to Superintendent of Documents, Government Printing Office, Washington, D. C.)

SPECIFICATIONS for every type of industrial and household commodity which has received such attention by government, corporation, association, or other groups are listed in a classified and in an alphabetical arrangement in this impressive document. The specifications themselves are not printed; merely a reference to them. Even this limited presentation requires 550 quarto pages. The volume is one which should afford a valuable reference work for any engineer or executive responsible either for purchases or for the maintenance of production quality.

THE BUSINESS PAGE

General Decline in Crops Predicted for 1932

Crop surpluses which have wreaked havoc in the food industry for the past two or three years stand to take a severe blow in 1932, preliminary figures indicate. The winter wheat crop in the United States apparently will be the smallest in 15 years, with an estimated production of 441,000,000 bu. for the season. Moreover, plantings of spring wheat, according to Federal Farm Board estimates, will amount to about 10 per cent less. In Canada, however, the growers are planting about 2,500,000 acres more of wheat this spring than last. In Europe, wheat acreage is on the decline.

Most of the lighter crops seem to be headed for a drop. Reductions of 41 per cent in the acreage of green lima beans for canning and of 31 per cent in beets are indicated. Forecasts place the crop of asparagus at 3 per cent higher and Florida pepper production up 14 per cent.

California reports the new cling peach pack is likely to be held to 6,000,000 cases, or about two-thirds of what it was in 1931. However, the probable carryover is 4,000,000 cases, which makes the total greater than it was last year.

From Spain comes a report that the olive crop is exceedingly small. It is estimated that the growing crop, together with the present stocks of some 15,000 hogsheads, will be something like half the quantity usually taken by the United States alone. Papershell-pecan growers of the South predict a 50 per cent smaller crop. Californians, however, are not curtailing their walnut crop, estimated production being 24,000 tons of unshelled walnuts, as against 18,900 tons last year.

Food Prices Lower

Despite encouraging indications of a month ago, business has taken a slight relapse. Continued decrease of borrowings from Federal Reserve by member banks and the possibility of forced extension of credit by banks help to keep hope alive. New methods for forcing this extension of credit to business enterprises have recently been recommended by President Hoover.

The budget remains unbalanced and the *Business Week* index of general business activity declined fractionally from 58.3 per cent of normal for the week ending April 16 to 58.0 per cent for the week ending May 14.

General commodity and food prices as reported in a weighted price index have shown a continued downward movement since the week ending April 16. For the week ending May 21 they show a total decline of 5.52 and 13.0 per cent, respectively, for the five weeks.

Increased unemployment and further decrease in earnings is reflected in A. & P. tonnage sales for April, 1932, which were 7.44 per cent below those of April, 1931. This decrease is 1.5 per cent greater than the March decrease.

Basis for the Curves

Retail food prices, factory employment, factory payrolls and wholesale prices are based on indexes of the Department of Labor. Cost-of-living index is that of the National Industrial Conference Board. Electric power consumption figures are furnished by *Electrical World*.

Domestic Exports of Food Show Decline in 1931

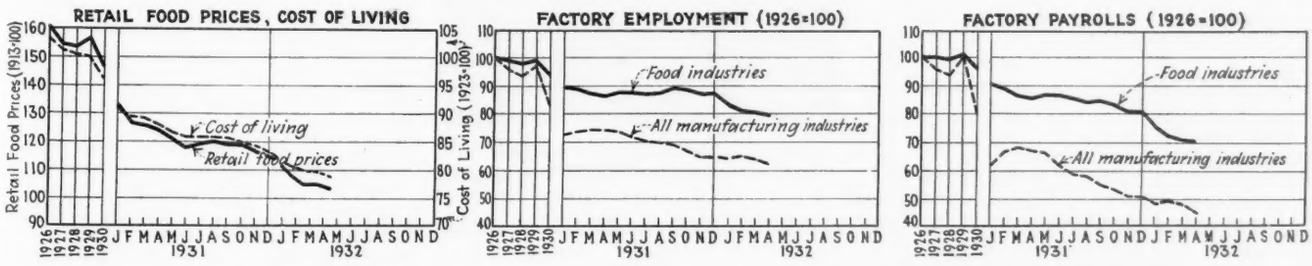
Diminishing world trade has taken its toll in the food industries. Exports of foodstuffs were about 30 per cent less in value last year than in 1930, according to the Chamber of Commerce of the United States analysis of foreign trade. Grains sustained the heaviest decline, with a decrease of 44.6 per cent in value.

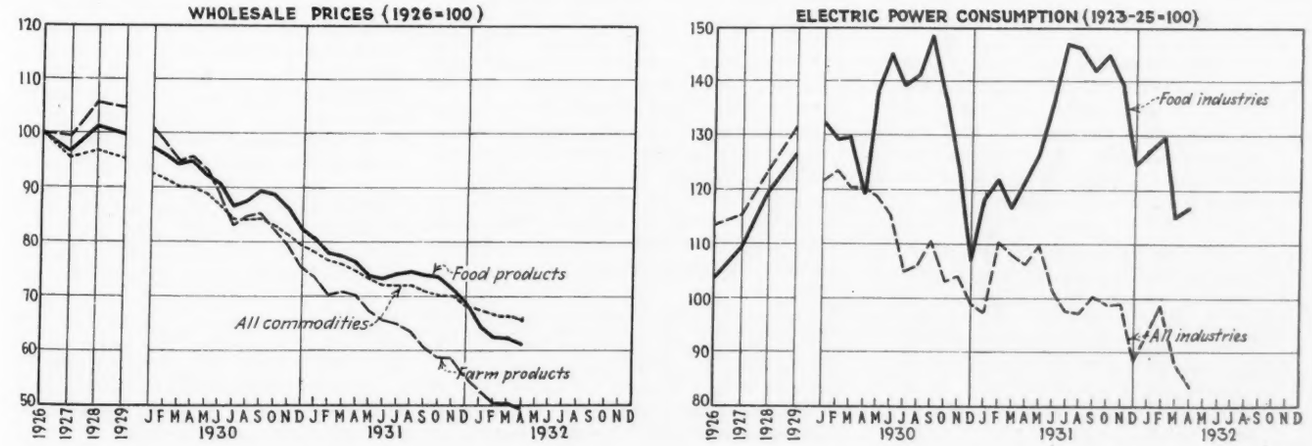
Lard exports in 1931 amounted to 568,708,000 lb., valued at $51,069,000, a decline of 11.5 per cent in quantity and 30.5 per cent in value. Exports of cured hams and shoulders declined 29.4 per cent in quantity and 44.9 per cent in value. Last year's bacon exports show far greater losses, the decreases in quantity and value being, respectively, 59.5 and 68.7 per cent.

Canned meats, however, fared much better, experiencing one of the smallest declines among the meat products. The quantity loss for this class of goods was 14.5 per cent.

Wheat exports in 1931 amounted to 80,311,000 bu., representing a value of $49,771,000, a decline of 8.5 per cent in quantity and of 43.5 per cent in value compared to 1930. This amounts to a 30.9 per cent decrease in volume and a 67.3 per cent drop in value, as compared with the 1926-30 averages.

However, the exports of some food products were larger in quantity last year than in 1930 and were above the five-year average. These products include fresh apples, oranges, canned fruit, prunes, grapefruit, dried and evaporated apricots, dried and evaporated apples, vegetable soap stock, fresh fish and nuts. Exports of edible vegetable oils and fats and lemons were higher last year than in 1930.





THIS MONTH—

JUNE

6-10—Association of Operative Millers, Louisville, Ky.

14-16—National Macaroni Manufacturers' Association, General Bronk Hotel, Niagara Falls, Ont.

15-July 15—International Bread-Making Exhibition (also macaroni products), National Fascist Federation of the Baking and Kindred Trades, Bologna, Italy.

19-21—New England Bakers' Association, Hotel Rockmere, Marblehead, Mass.

20-25—American Home Economics Association, Atlanta Biltmore Hotel, Atlanta, Ga.

27-30—Junior (West Coast) National Convention, American Society of Bakery Engineers, Ambassador Hotel, Los Angeles, Calif.

Hors d'Oeuvres

"SWEET MILK from sugared cows" may become the slogan of German dairies if the recent practice of feeding surplus sugar to cows is continued. It is reported that raws, second running, brought twice as much for cattle feed as they would have if sold to a refiner.

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AN ACUTE shortage in "goopher feathers" may occur this season, for a fuzzless peach has been developed and patented by W. W. Ramsey, Wenatachee, Wash., and will be put on the market by the Jasper Hovgaard Co., Astoria, Ore.

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NO SOONER do the grasshoppers achieve credit for a "tremendous outbreak" in the West than the Bureau of Agricultural Engineering announces a machine that will poison the insects. The net result would seem to be a lot of dead grasshoppers.

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INVENTION became the mother of something or other when it produced the limburger fork with a perfume atomizer attached, the nonskid banana peel, the sponge-equipped linoleum necktie for spaghetti eaters, and the fishing rod with a nibble alarm that were exhibited at the Fourth International Patent Exposition in New York.

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TWENTY-POUND yams, nuts resembling Brazil nuts but growing 25 to 30 in a single large hull, red peppers with more "fire," and improved varieties of mangoes are among new plants introduced by the Department of Agriculture.

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THE short season for fresh asparagus may be considerably lengthened, experiments indicate, by packing the product in glassine paper. Asparagus thus packed and stored in a chamber with a 90 per cent moisture content and a temperature of 32 to 33.8 deg. F. kept well for five to seven weeks.

What Food Men Are D

Confectioners Meet—Packers Los Long

Holland Criticized—Injur Rate

by Two—Private Truc

MEMBERS and friends of the confectionery industry braved the depression and turned out to the tune of 1,000 at the 49th annual convention of the National Confectioners' Association held at Atlantic City, N. J., May 24-26. The number of exhibitors was low, there being only 48, as compared with 87 last year.

Outstanding among the exhibits was the one showing, for the first time, dry pectin from citrus fruits as a basic raw material for the manufacture of jellies, gums, and creams. Edible nuts by General Foods Corp. and invert sugar, as such, by National Sugar Co. also enjoyed a premiere showing.

Arno E. Sander, reelected president of the National Confectioners' Association

At the conclusion of the educational part of the convention, the confectioners reelected Arno E. Sander, president of York Caramel Co., York, Pa., president of the association. Frank S. Records, Franklin, Ind., was made secretary-treasurer. He is a former secretary-treasurer of the National Paper Box Manufacturers' Association, Philadelphia, Pa., and executive secretary of the Steel Heating Boiler Institute, Cleveland, Ohio. Walter C. Hughes resigned as secretary-treasurer to accept the position of counsel to the members of the industry and of trademark counsel to the association.

NATIONAL MEAT PACKERS lost a hard-fought battle for the right to deal in wholesale groceries when the U. S. Supreme Court refused to reconsider its decision denying modification of the consent decree of 1920. The first decision of the court was made May 2, and on May 19 representatives of Swift & Co. and Armour & Co. filed a petition asking for a reversal. Wholesale grocers were sure the petition would fail and they did not oppose it. Their opinion was borne out on May 23 by negative action of the court.

Five grounds for the reversal of the decision were cited in the packers' petition, chief of which was the contention that the court had based its decision on the erroneous assumption that the packers had been guilty of the violation of anti-trust laws when they agreed to the decree in 1920.

Since the decision on May 2 was a reversal of a decision of the Supreme Court of the District of Columbia which permitted modification of the consent decree, the packers were caught with stocks of wholesale groceries on their shelves. As yet, no date has been set by which these stocks must be disposed of, and the packers are expected to continue their regular business until they have sold out. Wholesale grocers recently voted to offer their services to relieve the packers of their merchandise.

Whether this decision will end the 12-year-old legal war over the packers' consent decree is not certain—more than likely it won't—but the case will be allowed to lie dormant temporarily.

WARRING ACTIVITIES between milk producers and dairies have continued on a wide front during recent weeks. In Massachusetts, bitter controversies and long-winded discussions finally came to a peaceful conclusion when an agreement was reached whereby practically all the milk going into Boston is to be purchased through New England Dairies, Inc.

Massachusetts took a step forward in the sanitary production of dairy products when a bill for the creation of a state milk regulation board was approved by dairy interests and sent to the House for consideration. The measure would place all dairy farms under inspection by the state, whereas the inspection is now done by various towns and cities.

More than 200 dairy farmers in the Richmond (Va.) milk shed got together to solve their difficulties with the milk distributors, but three lengthy sessions failed to bring about an agreement. The distributors then made a "compromise" offer involving increase in the price of milk in pints. This was emphatically and unanimously rejected, and steps were taken to devise a plan for setting up a cooperative milk distribution system.

Doing and Saying

Long Fight—Milk War Continues—Rates—Vitamin C Isolated

Trucks Regulated

A new degree of intensity was reached in the hostilities on the New York milk shed recently when emergency milk committees attempted to persuade unaffiliated and Sheffield producers to unite with the Dairymen's League under a provisional contract. Sheffield Farms retaliated with a refusal to accept milk from anyone known to have signed the contract.

HOLLAND'S persistence in selling inedible "white grease" imported from the United States as "pure lard" has brought two notes of protest from the State Department, both of which failed to remedy the situation. The product is defined as a derivative of diseased or rejected parts of animals processed for use in machinery oil or in soap. Its sale for food is prohibited here, but the Dutch declared the refined substance could "without any reservation be used for human consumption."

FOOD INDUSTRY employees are more likely to suffer injury than are those working in steel and chemical plants, but their injuries are, on the average, much less severe, according to a report of the National Safety Council. The injury frequency rate for the food industry during 1931 was 15.86, and the severity rate was 1.01. The frequency rates in steel and chemical plants were 10.86 and 12.65, respectively, and the severity rates were 2.22 and 1.84.

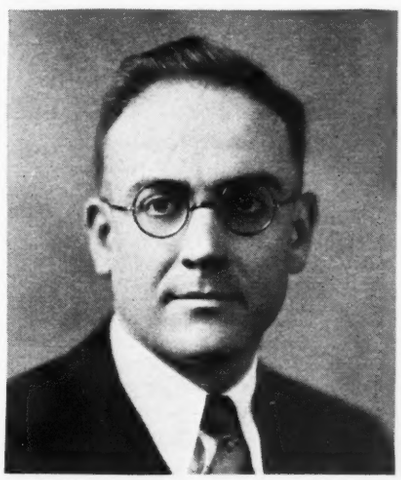
Among the food industry group sugar refineries have the highest frequency rate, 20.49, and are followed by flour and feed mills and dairies. Manufacturers of corn products have the lowest frequency rates, their average being 11.23. Plants of the latter type, however, average 3.40 for severity, which is the highest in the industry. The operations of confectionery manufacturers and bakeries are the least hazardous. On the whole, large organizations have fewer accidents in proportion to the number of employees than do the smaller ones. However, the severity of the accidents in the larger organizations is practically as high as in the smaller ones.

ANOTHER VICTORY has been gained by scientists in their efforts to understand and control the elusive vitamins. Two chemists, Dr. Ottar Rygh, of the University of Oslo, Norway, and Dr. C. G. King, at the University of Pittsburgh, have isolated and identified vitamin C, although there is some conflict in the conclusions drawn from their work.

Dr. Rygh has found in unripe oranges what he believes to be the so-called pro-vitamin. This, he declares, is identical with what chemists call narcotin. Narcotin crystals treated with ultra-violet light were used to cure a porpoise of scurvy.

Dr. King concentrated vitamin C from lemon juice and proved that guinea pigs would not develop scurvy when fed the substance. According to Dr. King, the physical and chemical properties of the concentrated vitamin C correspond to those of a hexuronic acid.

Two English scientists, Dr. F. B. Bowden and Dr. G. P. Snow, claim to have produced vitamin A from carotin, a reddish substance found in carrots, by treating it with ultra-violet light.



L. D. Whiting, who was elected president of the American Association of Cereal Chemists at the 18th annual meeting of the organization in Detroit, May 23-26. Mr. Whiting is chief chemist of Ballard & Ballard Co., Louisville, Ky. R. C. Sherwood was elected vice-president

PRIVATELY OWNED motor carriers are not only subject to load and size regulations by state governments but are open to special state taxation, according to two decisions handed down by the U. S. Supreme Court. The court held constitutional a Texas law which prohibits the operation on any highway of any motor truck exceeding specified limitations of size or failing to comply with certain requirements as to construction and equipment. The law also prohibits transportation of any load exceeding prescribed values in dimension and weight. Likewise, the court upheld a law passed by Kansas which requires private motor carriers to pay a tax of 0.5 mill per gross ton-mile.

—AND THE NEXT

JULY

11—Glass Bottle Blowers' Association of the United States and Canada, biennial meeting. Harry Jenkins, secretary, 1010 Colonial Bldg., Philadelphia, Pa.

11-16—Second Conference on Smaller Industries, Silver Bay, on Lake George, N. Y.

12-14—National Confectionery Salesmen's Association of America, Atlantic City, N. J.

18-23—International Congress for Scientific Management, Amsterdam, Holland.

—National Syrup and Molasses Association, mid-year meeting, Atlantic City, N. J. George P. Williams, secretary, Box 149, Kansas City, Mo.

Do you know of any national convention that we have neglected to list? Your help in making this calendar complete will be appreciated.

Concentrates

Introduction of the drought-resistant tepary bean from Arizona has reduced, perhaps eliminated, famine in Madagascar . . . Australian macaroni manufacturers prosper despite depression, having obtained large orders by sending sample shipments to England . . . Potential market for 15,000,000 gal. of raw soy bean oil has been created by discovery that the oil may be used in foundry cores . . . More profit is made by a dairy farm laborer than by his employers, New York State College of Agriculture finds . . . New York City gangsters have been bootlegging cream into the city on a large scale—perhaps the town is too wet to allow a profit on liquor . . . It pays to advertise—of 60 companies nationally important 17 years ago, more than half have fallen by the wayside because they failed to keep on the printed page, Gilbert T. Hodges, president of the Advertising Federation of America, discloses . . . Wisconsin College of Agriculture will offer a course designed to provide a basic background in all phases of the canning industry—sheepskins will be awarded . . . A new species of salmon, a cross between pink and sockeye, has been developed by the Cultus Lake hatchery, the Canadian National Railways reports . . . The food industry is the greatest single business in the country, being a fifteen billion dollar affair . . . Possibilities of making gasoline-substitute alcohol from surplus sugar cane are being studied in Cuba . . . A tax of 2½ and 4 per cent on tires and tubes, respectively, has been voted into the tax bill by the Senate Finance Committee, a 14-percent tax on incomes of corporations was provided for in a proposal adopted by the Senate . . . Canned, frozen and packaged fish, fishery products and byproducts worth nearly $100,000,000 were produced in the United States and Alaska last year . . . Canned-fish production for 1931 was 24 per cent less than in the previous year; frozen fish output fell 10 per cent; byproducts, 30 per cent . . . Chocolate manufacturers used almost five and one-half million pounds more of milk and milk products last year than in 1930 . . . Foreign trade of 22 leading countries declined in value from $40,685,000,000 in 1930 to $29,614,000,000 in 1931.

TRADE NOTES

BAKER-BENNETT-DAY, INC., has been formed as a subsidiary of General Foods Corp. to specialize in the processing and marketing of a line of nuts. The company will be primarily interested in the development and expansion of Vitapack shelled nuts.

CAMPBELL SOUP CO. has applied the transportation methods of the dairy industry to the hauling of tomato juice in insulated tank cars from a leased plant in Indiana to its Chicago plant, it is reported. The procedure is understood to involve preheating to 180 deg. F. to pasteurize the juice, followed by chilling to 34 deg. F. by the steam vacuum method and loading into tank cars.

CANDY BRANDS, INC., Boston, Mass., and Brooklyn, N. Y., went into the hands of temporary receivers May 5 at the petition of United Chocolate Refiners, Inc. The company is said to be solvent but in a temporary condition of financial embarrassment.

COCA-COLA CO. has been made a defendant in a series of suits recently in a legal battle of soft drinks. Early this month, Mirror Co. chain of candy stores filed two suits against Coca-Cola asking damages amounting to $1,250,000. About a week later, Happiness Candy Stores, Inc., filed another suit against the company asking for damages of $2,250,000. Previously, Loft, Inc., and the Pepsi-Cola Co., Inc., had filed suits against Coca-Cola for damages of $5,250,000 and of $2,000,000, respectively. All of these suits are based upon the alleged attempt of Coca-Cola Co. to interfere with the sale of Pepsi-Cola in the candy stores named in the suits.

FROSTED FOOD SALES CORP., subsidiary of Frosted Foods Co., Inc., is now handling the distribution and sale of Birdseye quick-frozen food products for Birdseye Packing Co., Inc., and Pacific Frosted Foods, Inc. Birdseye frosted foods are being produced at five permanent and five portable packing plants and distributed through 350 retail outlets. The company is offering a new product, frozen rabbit meat.

MICHIGAN ALKALI CO. is building a new solid CO_2 plant at Wyandotte, Mich., which will have a capacity of 150 tons daily and will be one of the largest in the world. The new plant will cost about $750,000.

PARK & TILFORD, confectionery manufacturers, New York, N. Y., closed their plant at the beginning of May and their entire equipment was purchased by Union Confectionery Machinery Co., which will dispose of it to the trade.

PROCTER & GAMBLE CO. is reported to be considering plans for the purchase or construction of a soap plant in or near London. R. R. Deupree, president of the company, has recently been in England and is understood to have been carrying on negotiations for the project.

SOLID CARBONIC CO. and the DryIce Corp. of America merged recently. These companies make and distribute solid CO_2, and, with their interests combined, it is said that they will control more than half of the entire capacity of the industry. The consolidated company will have plants in Niagara Falls, N. Y.; Deepwater Pond, N. J.; Elizabeth, N. J.; and Peoria, Ill.

PERSONAL

GEORGE N. ARMSBY, vice-president of California Packing Corp., San Francisco, Calif., and former vice-president and director of Bancamerica-Blair Corp., has been elected chairman of the board and president of Bancamerica-Blair Corp.

DR. CLYDE H. BAILEY, professor of agricultural biochemistry at the University of Minnesota, was presented with the Thomas

Dr. Clyde H. Bailey

Burr Osborne gold medal of the American Association of Cereal Chemists at its annual meeting in Detroit, Mich., May 23-26. The award represents recognition of distinguished contributions to cereal chemistry.

GEORGE W. COBB, general manager of sales of the American Can Co., retired June 1 after nine years of service in that office.

GEORGE A. FOX, Kansas City, Mo., has been elected president of the National Association of Manufacturers of Fruits and Flavoring Syrups.

W. F. HUBERT, of Borden Co., was elected president of the National Cheese Institute at its annual meeting May 12.

ELLIS R. MEAKER, president of Ivanhoe Foods, Inc., Auburn, N. Y., was recently elected president of the Mayonnaise Manufacturers' Association.

ROZIER D. OILAR, chemical engineer and food industry specialist, has moved both his own headquarters and those of the American Equipment Co. from Indianapolis, Ind., to 212 North St., West Lafayette, Ind. The change followed his return from Mexico.

WILLIAM H. RAYE, president of Frosted Foods Co., Inc., of Bluepoints Co., and of General Seafoods Corp., was elected president of Frosted Foods Sales Corp.

R. R. THOMSON, who has been in charge of several manufacturing operations of General Foods Corp. in the West, has been made manager of eight of the company's Western plants. Udell C. Young, general superintendent of the Maxwell House Coffee division, was given a similar position with respect to the plants in the East.

GEORGE S. WARD, former president of Ward Baking Co. and past president of the American Bakers' Association, was honored recently by the Cuban government for his work in the field of sanitation. He was made a grand official of the Order of Dr. Carlos J. Finlay, highest decoration of the Cuban government, for his pioneering work and ceaseless efforts in reducing infant mortality by supplying high-grade pure milk, and for his betterment of the Cuban dairy industry in general.

LEONARD E. WOOD, vice-president and general manager of the California Packing Corp., has been elected president of the company. R. M. BARTHOLD, president, has been made chairman of the board.

OBITUARY

LORENZO BENEDICT, president of Worcester Salt Co. since 1910, died of pneumonia May 16 in East Orange, N. J. Mr. Benedict was 70 years old and had spent 53 years of his life in the salt industry.

CHARLES C. MOORE, 63, a director of the Sylmar Packing Corp., olive packer, and of Golden State Co., Ltd., San Francisco, Calif., died at his country home at Santa Cruz, Calif., April 17, of cerebral hemorrhage. Mr. Moore was president of the Charles C. Moore & Co. Engineers.

MERRITT JONES NORTON, vice-president of Borden Co. since 1926 and director of Associated Grocery Manufacturers of America, recently died of heart attack. Mr. Norton joined Carnation Milk Products Co., Forest Grove, Ore., in 1907. Four years later he became general superintendent of the company's Eastern plants and in 1918 was made a vice-president. In another seven years he had become president of the American Milk Products Co.

PHILIP G. SCHAEFER, for many years the head of Lake View Baking Co., died May 15 of arteriosclerosis at his home in Buffalo, N. Y. Mr. Schaefer was born in Wurttemberg, Germany, in 1862.

WILLIAM J. SCHREIBER, president of Purity Cone & Pretzel Co., Indianapolis, Ind., died recently after a five months' illness.

EDWARD F. SWIFT, 68-year-old chairman of the board of Swift & Co. and president of Compania Swift Internacional, fell to death from a window of his Chicago apartment May 28. Mr. Swift was the son of Gustavus Franklin Swift, founder of the meat packing firm that became one of the largest in the world.

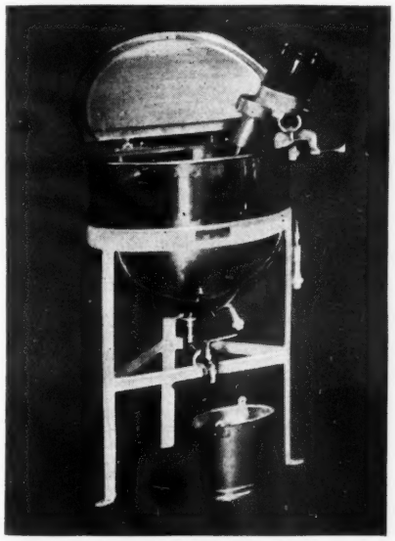
W. J. UIKLEIN, 73-year-old retired technical director of the Schlitz Brewing Co., of Milwaukee, Wis., died recently.

WILLIAM BRADLEY WANZER, 68-year-old dean of Chicago's milk distributors, died May 24 following a stroke of paralysis. Mr. Wanzer was president of Sidney Wanzer & Sons Milk Co., which was founded in 1875 by his father, and was head of Milk Dealers' Bottle Exchange and a director of the Milk Foundation.

NEW EQUIPMENT FOR FOOD MANUFACTURERS

New Nickel Alloy for Use In Food Equipment

High resistance to tarnish and corrosion, together with favorable mechanical properties and malleability, is claimed for the new nickel-chromium alloy developed by the International Nickel Co., Inc., New York, N. Y. The new metal, called Inco Chrome Nickel, contains from 12 to 14 per cent chromium and is expected to find general application in



the food field. The steam-jacketed kettle shown in the illustration is only one of its applications.

Laboratory tests and practical applications in dairy equipment have brought out these qualities of the alloy. In no tests made to date, the manufacturer states, has there been any evidence of corrosion or tarnishing by sweet milk under any conditions of temperature or aeration. Samples of the metal were exposed within an operating buttermilk machine during the process of manufacturing culture buttermilk, and the rate at which the specimens were corroded was equivalent to a penetration of only 0.0001 in. per year, with equipment in continuous use. Boiling onions, beans, brussels sprouts and chicken giblets are included in the products used to test the tarnish and corrosion-resisting properties of the alloy. Tests also demonstrated that the metal was not affected by chlorine sterilizing solutions or by alkaline cleaners. Neither was it corroded by brine or by boiling vinegar salt solutions. Tests made with tomato, lemon, grape and pineapple juices, fully aerated at room temperatures, showed no corrosion, except with lemon juice, which affected the alloy at a rate only 1/62 of that for nickel.

In its mechanical properties, this chrome-nickel alloy compares favorably with other metals used in the fabrication of dairy equipment. It has greater strength than nickel or Monel metal and has equivalent ductility. In practice, it has been found that it can be handled at least as readily as nickel or Monel metal in lock seaming, deep drawing, and spinning and can be soft soldered, silver soldered, brazed and welded by both oxyacetylene and arc-welding methods.

Development of a new welding rod makes the welding of this alloy simple and rapid and gives a seam of high strength and corrosion resistance.

Synchronous Motor for Milling Industry

A synchronous motor of standard mechanical construction having a high starting torque and low starting current is being manufactured by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. The desired starting features have been obtained by the use of a special "damper" winding in which the bars are phase-connected and brought out through slip rings to an external starting resistor. By changing the amount of external resistance in the damper winding circuit the actual starting torque can be varied greatly; as much as up to 200 per cent can be obtained. Therefore, the starting torque can be adjusted for the maximum starting load while the starting current is kept at a minimum.

After the starting button is pressed, the controller makes starting entirely automatic. A timing device cuts out the external resistance in the damper winding circuit and the motor is pulled into step by the field excitation, which is automatically applied when the motor approaches full speed.

An automatic increase in the torque developed by the motor at standstill, starts the load under unusually heavy conditions, and, if the motor fails to start the load in the first point of the controller, the higher torque developed on the succeeding points will insure starting.

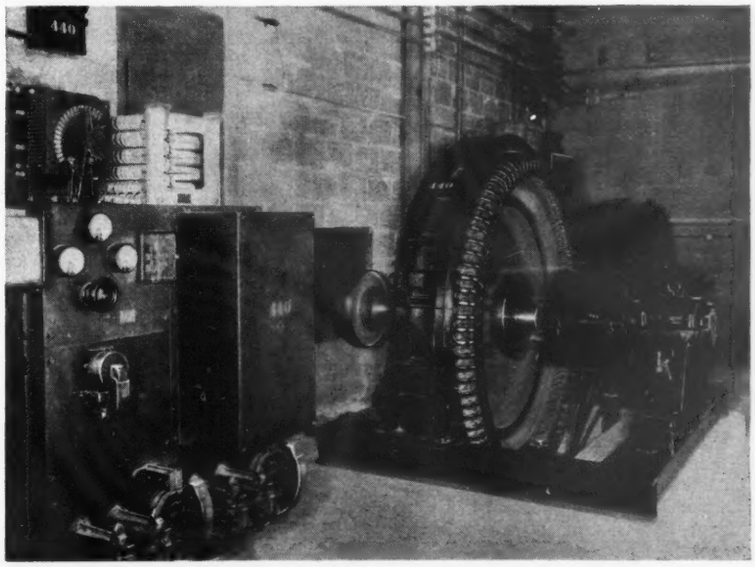
Shipping Tape Glued as Wanted

Adaptable to handle kraft paper tape ranging from ½ to 3 in. wide of 35-, 60-, or 90-lb. stock, the machine manufactured by Potdevin Machine Co., 1221 38th St., Brooklyn, N. Y., produces freshly glued shipping tape as wanted.

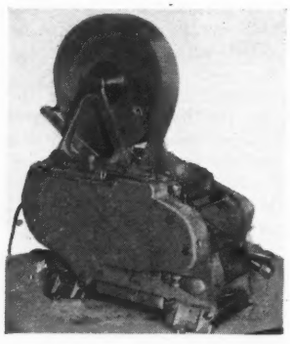
This paper gluing unit may be operated at a speed of 2 ft. of glued tape per second and is said to show a substantial saving in cost over the use of standard gummed tape for sealing purposes. The unglued paper feeds through this machine and is freshly gummed similarly to gummed tape through a moistening machine. Also this tape may be prepared in various length strips or in predetermined length strips ranging from 9 to 60 in. through increments of 3 in. by means of a model fitted with a measurement gage.

The machine is motor-operated and is set in motion by pressing down a lever placed conveniently on front of the machine. If the machine is not fitted with a measurement gage, the length of strip is determined by releasing the lever which stops the motor and cuts off the tape. Even though the machine may be fitted with a measurement gage, longer strips of tape may be obtained by continued pressure on the lever. As soon as the lever is released the glued strip is cut off.

Cleaning of the machine consists of covering the glue tank with an air-tight cover and wiping two small brass



rollers free from glue. The thickness of glue put on the tape is regulated by an adjustable gage which can be regulated according to varying conditions of paper absorbency or atmospheric conditions.

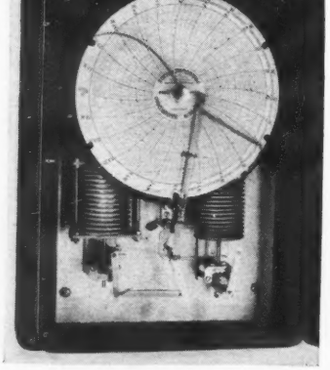


Staycloths, buckram, holland, and similar sealing and reinforcing tapes may be glued the same as kraft paper. Because the machine will handle rolls of paper with 16-in. diameter containing 3,500 ft., refilling is made less often than on gummed-tape moistening machines, which take 600 ft. rolls of tape.

Gage Measures Vacuum In Absolute Units

No reference need be made to a barometer to determine the absolute pressure in vacuum chambers when measurement is made with the recording absolute pressure gage announced by the Bristol Co., Waterbury, Conn. The instrument is said to be automatically corrected for barometric variations and compensated for temperature changes.

Two diaphragm elements comprise the actuating mechanism. One is connected to the vacuum line and the other is affected by barometric pressure variations. The



movements of these elements are added algebraically and transmitted to a recording pen arm by a differential transmitting linkage. The chart is operated by a spring-motor clock; a telechron movement may be had if desired.

The instrument is housed in an all-metal case. It can be furnished for ranges as low as from 0 to 50 mm. head of mercury pressure absolute or equivalent.

THE MANUFACTURERS OFFER

Air-Conditioning Equipment—Vertical and horizontal air conditioners, humidifiers, and proof boxes are described in a catalog issued by the Maryland Air Conditioning Corp., Baltimore, Md.

Dairy Cleansing Powder—Under the trade name Metso, sodium metasilicate in powder and crystalline form is available through the Philadelphia Quartz Co., 121-129 South Third St., Philadelphia, Pa., for cleaning dairy equipment and buildings. The product and its uses are described in a 15-page illustrated pamphlet.

Vegetable Lecithin in Chocolate—In a booklet containing several tables and graphs, Ross & Rowe, Inc., 80 Broad St., New York, N. Y., explains the function of Yelkin in the manufacture of chocolate products.

Rubber Belt Conveyors — The Diamond Rubber Co., Inc., Akron, Ohio, gives the pictorial answer to some three-score materials handling problems in an attractive bulletin, "How Shall We Handle It?"

Hand Truck and Trailer—A well-illustrated, 8-page leaflet of the Howe Chain Co., Muskegon, Mich., describes the line of Jak Tung Trucks, made by the company, and explains how these trucks serve as hand trucks, trailers, and for temporary storage bins.

Milk Cooler Cabinets—Why milk spoils, how to prevent the spoilage, and the specifications of the sanitary cooler cabinet manufactured by the Victor Products Corp., Hagerstown, Md., are the subject matter of a 13-page illustrated booklet.

Water Stills—The principles, parts, and types of the stills manufactured by the Atlas Copper & Brass Manufacturing Co., 2724-42 High St., Chicago, Ill., are set forth in an attractively illustrated 28-page booklet.

Process Equipment — The F. J. Stokes Machine Co., Tabor Road, Philadelphia, Pa., in its Catalog No. 31, illustrates and describes its line of processing machinery, including dryers, extraction and solvent recovery apparatus, condensers, vacuum pumps, impregnating apparatus, autoclaves, vacuum fumigating apparatus, evaporators, vacuum stills, automatic water stills, mixers, and table compressing equipment.

Canning Machinery—Sprague-Sells Corp., Hoopeston, Ill., illustrates and gives the specifications and uses of its new equipment in a loose-leaf supplement to its General Catalog No. S-100. Thirteen new machines are listed.

Kettles and Vacuum Pans—In a 7-page leaflet, the Lee Metal Products Co., Inc., Philipsburg, Pa., illustrates and describes its line of kettles and vacuum pans.

Portable, Ceiling, and Ventilating Fans—Descriptions and illustrations of the ventilating equipment manufactured by the Century Electric Co., 1806 Pine St., St. Louis, Mo., are included in the company's attractive 12-page bulletin.

Solid CO_2—A well-illustrated 8-page leaflet of the International Carbonic Engineering Co., Kennett Square, Pa., announces 2,000-lb. blocks of solid CO_2 and describes the company's refrigerating equipment.

Friction Clutches—The Carlyle Johnson Machine Co., Manchester, Conn., describes the mechanisms, qualifications, and applications of its friction clutches in a 28-page illustrated catalog.

Bottle Cleaners — In a folder leaflet printed in colors, the Geo. J. Meyer Manufacturing Co., Milwaukee, Wis., illustrates and describes the mechanism and operation of its new junior size bottle cleaner.

High-Pressure Laboratory Press—Hand-operated high pressure, hydraulic presses for extraction and test purposes are illustrated and described in a 24-page booklet prepared by Fred S. Carver, 345 Hudson St., New York, N. Y.

Gas Pumps—In a 4-page, loose-leaf bulletin, the Roots - Connersville-Wilbraham division of International-Stacey Corp., Connersville, Ind., describes its Victor-Acme pumps and gives their capacities and prices.

Formulas for Food Products—In a 14-page folder leaflet of the Glyco Products Co., Inc., Bush Terminal Bldg. No. 5, Brooklyn, N. Y., are given formulas for flavors, syrups, emulsions, jellies, jams, meringue, marshmallow, and similar products. Foam and froth producers also are listed.

International Trucks in the Dairy Industry—In a 32-page illustrated booklet the International Harvester Co., 606 South Michigan Ave., Chicago, Ill., emphasizes the type of truck used by dairymen and gives a partial list of dairies operating fleets of International Harvester trucks.

The Consulting Chemist and Your Business—In a 16-page booklet, Foster B. Snell, Inc., 130 Clinton St., Brooklyn, N. Y., describes how a technical organization co-operates with industry.

Short Center Drive—Specifications for Vim efficiency drive standard from 5 to 100 hp. are compiled in 148-page book by the research staff of E. F. Houghton & Co., Philadelphia, Pa.

Thermometer Controllers—Various types of thermometer controllers manufactured by Bristol Co., Waterbury, Conn., for ranges up to 1,000 deg. F. are fully described in the 20-page catalog No. 2025.

Equipment Refrigerated by Solid CO_2—American Car & Foundry Co., 30 Church St., New York, N. Y., has prepared a folder-leaflet on motor truck bodies and shipping and storage containers for use with solid CO_2 refrigerants.

Grain Cleaners—Section A, Catalog No. 100 of S. Howes Co., Inc., Silver Creek, N. Y., consists of 56 pages devoted to Eureka grain cleaners and graders.

Recording Instruments — Instruments of C. D. type for alternating and direct current manufactured by General Electric Co., Schenectady, N. Y., are the subject matter of the 18-page bulletin No. GEA-1061D.

Plate Pasteurizer—The York Ice Machinery Corp., York, Pa., announces and describes its high-temperature, short-time pasteurization equipment in its 8-page Bulletin No. 32176, giving the cycle of operation and the features of the system.

Roller Chains — Bulletin R-50 of the Morse Chain Co., Ithaca, N. Y., is devoted to equipment for roller chain transmission.

Detergents—In an 8-page illustrated folder Cee-Bee Laboratories, Ltd., 655 East Gage Ave., Los Angeles, Calif., cites applications for its cleaning compounds.

Improving Dealer Accounting Practices—A 22-page booklet published by the Policyholders Service Bureau, Metropolitan Life Insurance Co., New York, N. Y., reports methods used by manufacturers and wholesalers to improve the accounting practices of their retail outlets.

Nickel Alloy Steel Products—The 20-page Buyers' Guide for 1932 of the International Nickel Co., Inc., 67 Wall St., New York, N. Y., is a directory of manufacturers, fabricators, and distributors of these alloys.

Vacuum Refrigeration System—Bulletin W. J.-31-3 is an 8-page pamphlet of the Foster Wheeler Corp., 165 Broadway, New York, N. Y., describing and giving applications of its new method of refrigeration by evaporating under high vacuum a portion of the water or brine to be cooled.

Flue Gas Indicator-Recorder—In Catalog No. 1025, C. J. Tagliabue Manufacturing Co., Park & Nostrand Aves., Brooklyn, N. Y., describes and illustrates by photographs and drawings the construction and operation of its automatic boiler flue gas indicator-recording analyzer.

Operation Control Instruments—Instruments for controlling, recording and indicating temperatures, pressure, humidity, and flow are described and illustrated in bulletin 174 of the Foxboro Co., Foxboro, Mass.

Molasses Feed Mixers — In a 16-page illustrated booklet, known as Bulletin No. 46-B, Robinson Manufacturing Co., Muncy, Pa., describes its various types of molasses feed mixing plants.

CONSTRUCTION NEWS

PROPOSED WORK
BIDS ASKED

Bakery—Butter Nut Bread Co., c/o O. J. Johnston, et al., Texarkana, Tex., awarded contract for a 2 story, 75 x 135 ft. bakery at State Line and 10th St., to Hardy Construction Co., Texarkana. Estimated cost $50,000.

Bakery—A. N. Denault Bakery, Washago, Ont., plans construction of a plant. Estimated cost $40,000. Maturity indefinite.

Bakery—A. Shulman, 305 Broadway, New York, N. Y., plans completed for a 2 story, 100 x 100 ft. bakery at White Plains and Brady Aves. Estimated cost $60,000. M. Siegel, 1775 Broadway, New York, is architect.

Bakery Addition—Larsen Baking Co., Henry and Mill Sts., Brooklyn, N. Y., plans a 2 story addition to bakery. Estimated cost $30,000. J. E. Hopkins, 250 Park Ave., New York, is architect.

Baking Plants—Union Socialist Soviet Republics, c/o Amtorg Trading Corp., 261 5th Ave., New York, N. Y., plans construction of baking plants at Magnitogorsk, Nizhni Tagil and Cheliabinsk, 100 tons daily capacity, also at Sverdlovsk, 250 tons capacity. Estimated cost $5,500,000.

Canning Plant (Vegetable) — J. B. Bell, Cotulla, Tex., plans construction of a 1 story vegetable canning plant at Crystal City. Private plans. Some machinery will be purchased.

Fish Canning Plant—Libby, McNeil & Libby, Union Stock Yards, Chicago, Ill., plans alterations and extensive re-equipment of fish canning plant at Taku Harbor, Alaska. Estimated cost to exceed $100,000. Maturity indefinite.

Confectionery Factory — Hershey Chocolate Co., Hershey, Pa., having revised plans prepared for construction of a warehouse. Estimated cost to exceed $150,000.

Creamery—George N. Clark, Lebanon, N. J., plans reconstruction of creamery plant at Whitehouse Station destroyed by fire. Estimated cost to exceed $40,000. Architect not selected.

Creamery—Mistletoe Creamery Co., c/o G. W. Maggard, Mgr., 219 Austin St., San Antonio, Tex., plans construction of a 2 story creamery at Jones and Broadway Sts. Estimated cost $50,000. A. B. and R. M. Ayers, Smith-Young Tower, San Antonio, are architects.

Dairy Plant—Holland Farms, Blake Ave. and Ashorn St., Brooklyn, N. Y., plans addition and alterations to dairy plant. H. L. Alper, 1448 26th St., Brooklyn, Archt.

Dairy Plant — Model Dairy Co., Smith St., Corry, Pa., will receive bids about June 1 for a 1 story, 80 x 100 ft. dairy building at Smith and West Wayne Aves. Braziell & Anderson, 309 4th Ave., Pittsburgh, are architects.

Ice Cream Distribution Plant — Castle Ice Cream Co., 53 East Blackwell St., Dover, N. J., will receive bids late summer for a 2 story distribution plant on Waverly Place. Estimated cost $40,000. Louis E. Jallade, 15 East 47th St., New York, N. Y., is architect.

Milk Plant — Drimilk Products Ltd., c/o Borden Co., 350 Madison Ave., New York, N. Y., plans to either rebuild plant at Courtland or enlarge plants at Tilsonburg and Staffordville, Ont. Estimated cost $100,000. Maturity soon.

Milk Products Plant—William Byrnes, Auburndale, Wis., will soon award contract for a 1 story, 42 x 80 ft. milk products plant including equipment. Estimated cost $40,000. G. A. Krasin, Marshfield, is architect.

Milk Products Plant — Owner, c/o G. A. Krasin, Marshfield, Wis., having plans prepared for construction of a 1 story, 42 x 80 ft. milk products plant including equipment at Auburndale. Estimated cost $40,000.

Milk Plant—W. M. Evans Dairy Co., 246 Gates Ave., Brooklyn, N. Y., receiving bids on general and separate contracts for a 3 story addition to milk plant at Fulton St. and Elders Lane. Estimated cost $30,000. L. Lauritzen, 356 Fulton St., Brooklyn, is architect.

Distribution Plant, etc.—Sheffield Farms Co. Inc., 524 West 57th St., New York, N. Y., having revised plans prepared for a 2 story distribution plant, office, etc., at Union City, N. J. Estimated cost $40,000. George Willaredt, 411 23rd St., West New York, N. J., is architect.

Produce Plant—Owner, c/o C. J. Wolaver, Perry, Okla., plans construction of a produce plant. Estimated cost $150,000.

Ice Plant and Creamery Equipment—Department Welfare, Ninth and Oak Sts., T. S. Brindle, Dir., Columbus, O., will soon award contract for ice plant ammonia system, 20 ton daily capacity, also creamery equipment consisting of two 400 gal. and one 200 gal. pasteurizers, 600 gal. separator, 600 gal. churn and 600 gal. aerator cooler.

Plant—Flake-Ice Corp., 205 Water St., Brooklyn, N. Y., leased premises at 574 Ferry St., Newark, N. J., and plans alterations and re-equipment of machine shop and laboratory building. Owner now purchasing equipment.

Ice Plant—Boulder City Builders Supply Co., Boulder City, Nev., has been granted permit by U. S. Bureau of Reclamation to construct ice plant.

Ice Plant—Palmer Candy Co., C. Blomberg, Supt., 209 Douglas St., Sioux City, Ia., plans remodeling 1 story, 50 x 150 ft. ice plant at 207 Douglas St. Estimated cost $60,000. Private plans. Work will be done by day labor on sub-contract basis. Ice making machinery awarded to York Ice Machinery Corp., 1113 Cornelia Ave., Chicago, Ill.

Ice Plant—Pennsylvania R.R., Pennsylvania Station, New York, N. Y., completed plans for alterations to ice plant at Harsimus Cove yard, Jersey City, N. J. Estimated cost $40,000. A. C. Watson, New York, is chief engineer. Work will be done by separate contracts under the supervision of Fruit Growers Express Co., Munsey Bldg., Washington, D. C., lessee.

Ice Manufacturing Plant—Vigo Ice & Cold Storage Co., 120 North Water St., Terre Haute, Ind., plans reconstruction of ice manufacturing plant. Estimated cost $40,000.

Refrigeration Plant — Owner, c/o E. J. Symmes, Haberfelde Bldg., Bakersfield, Calif., Archt., having preliminary plans prepared for refrigeration plant. Estimated cost $50,000.

Food Packing and Preserve Making Plant—Long Island Packing Co., 21-39 4th Ave., Long Island City, and Gordon & Delworth Inc., Canton Pl., Brooklyn, N. Y., leased plant at 21-39 4th Ave., Long Island City, and plans alterations and re-equipment for food manufacture. Work will be done by day labor and separate contracts under supervision of F. Nolte, 21-39 4th Ave., Long Island City.

Food Storage Building — Board of Trustees, Miami University, Oxford, O., having plans prepared for a 2 story, 64 x 152 ft. food storage and preparation building. Estimated cost $150,000. Garber & Woodward, 616 Walnut St., Cincinnati, are architects. Fosdick & Hilmer, Union Trust Bldg., Cincinnati, engineers.

Grocery Warehouse — D. Toriello & Sons, Struthers, O., plans reconstruction of grocery warehouse and office destroyed by fire. Estimated cost to exceed $40,000.

Market Building—Silver Home Construction Co., 499 Pennsylvania Ave., Brooklyn, N. Y., having plans prepared for a 1 story, 40 x 98 ft. market building, including refrigeration plant at Livonia and Sheffield Aves. S. Millman, 1780 Pitkin Ave., Archts.

Market Building and Refrigeration Plant—Daniel Kaufer, 113-10 Sutphin Blvd., Jamaica, N. Y., having plans prepared for a 1 story, 40 x 100 ft. market building, including refrigeration plant. L. Danancher, 149-14 Jamaica Ave., Jamaica, Archt.

Pickle Works—East Northport Pickle Works, East Northport, N. Y., plans reconstruction of plant destroyed by fire. $40,000. Maturity indefinite.

Hatchery—Department of Agriculture, Washington, D. C., acquired site near San Angelo for construction of a fish hatchery including necessary vats, etc. Estimated cost $40,000. Private plans. Maturity soon.

Sugar Refinery—National Sugar Refining Co., 55th Ave. and Second St., Long Island City, N. Y., plans alterations to power house at 56th Ave. and West Second St. Estimated cost to exceed $25,000. L. T. Bromfield, c/o owner, is architect.

Grain Elevator—Standard Elevator Co., Meacham, Sask., plans construction of a grain elevator. Estimated cost $75,000.

Grain Elevator—Toronto Elevators Construction Co., c/o G. C. Leitch, 200 Bay St., Toronto, Ont., will soon award contract for construction of a grain elevator, 2,000,000 bu. capacity at Grampus Bay site, Oswego, N. Y.

Grain and Malting Plant—Froedtert Grain & Malting Co., South 38th and Grant Sts., Milwaukee, Wis., plans addition and re-equipment of power plant at Winona, Minn. Estimated cost $40,000. F. J. Postel, 3444 North Hackett Ave., Milwaukee, is architect.

Dehydration Plant—New York Interests, represented by F. E. Bowden, 2011 Clay St., Fresno, Calif., plans construction of a dehydration plant, 80 to 90 tons of fruit or vegetables daily at Visalia. Estimated cost $50,000.

Packing Plant and Warehouse—Apple Growers Association and American Fruit Growers Association, Odell, Ore., plan to rebuild fruit packing plant and warehouse destroyed by fire. Estimated cost $75,000.

Plant—Hood River Fruit Juices Co., c/o P. C. Peterson, Route 4, Room 242, Hood River, Ore., plans construction of a plant for removing acetic acid and alcohol from cider and fruit juices without imparing the flavor. Estimated cost $50,000.

Abattoir Building—Charles Miller & Co., 42 Secaucus Road, North Bergen, N. J., plans repair and reconstruction of abattoir, slaughter house and meat packing plant destroyed by fire. Estimated cost $40,000. Architect not selected.

Packing Plant—Armour & Co., Buenos Aires, Argentina, plans reconstruction and re-equipment of plant at Avellaneda recently destroyed by fire. Estimated cost to exceed $150,000. Part of work will proceed at once.

Packing Plant (Meat)—Idaho Meat Producers Co-Operative Inc., Caldwell, Idaho, having preliminary plans prepared for meat packing plant. Estimated cost $200,000. Architect not selected.

Packing Plant (Meat)—Munns Bros. Packing Co., Frankfort Pike, Lexington, Ky., plans to rebuild warehouse and refrigeration plant destroyed by fire. Estimated cost $40,000.

Packing Plant (Meat)—Swift & Co., Packers and Exchange Aves., Chicago, Ill., and 3750 Jewel St., Vernon, Calif., plans a 3 story addition to meat packing plant at Vernon, Calif. Estimated cost $100,000.

Packing Plant (Meat) — Union Socialist Soviet Republics, c/o Amtorg Trading Corp., 261 5th Ave., New York, N. Y., plans reconstruction of meat packing plant at Odessa. $1,290,000. Work by day labor and technical aid contracts. Work under way on $900,000 cold storage plant.

Packing Plant—A. H. Kiner Packing Co., 1080 East Hudson St., Columbus, O., plans to rebuild packing plant destroyed by fire. Estimated cost to exceed $40,000. Architect not selected.

CONTRACTS AWARDED

Bakery—George Rushton Baking Co., Wichita, Kan., awarded contract for construction of a 26x88 ft. bakery to George Siedhoff Construction Co., Broadview Hotel Bldg., Wichita.

Bakery Addition—Nashua Baking Co. Inc., 15 Mulberry St., Nashua, N. H., awarded contract for a 1 and 2 story addition to bakery to Osgood Construction Co., 25 East Hollis St., Nashua.

Ice Cream Plant—Linbrook Ice Cream Co., 88 Center St., Middletown, Conn., awarded contract for a 1 story, 50 x 70 ft. ice cream manufacturing plant on Saybrook St. Towner & Sellew Associates Inc., 363 Main St., Middletown, are architects.

Produce Plant—Farmers Produce Co., Crawfordsville, Ind., will build a 1 story, 30 x 165 ft. plant. Estimated cost $40,000. Private plans. Work will be done by owner's forces.

Produce Warehouse—Zwick & Schwartz, 12 Union St., Middletown, N. Y., awarded contract for a 1 story, 100 x 135 ft. produce warehouse and refrigeration plant to Trojan Construction Co., 374 Bedford Ave., Brooklyn. $40,000.

Ice Manufacturing Plant—Rubel Corp., Fulton St. and Waverly Place, Brooklyn, N. Y., awarded contract for a 2 story, 66 x 97 ft. addition to ice manufacturing plant at St. Ann's Ave. and 159th St., New York, to Gustav Jensen, 8124 11th Ave., Brooklyn.

Ice Manufacturing Plant—Mystic Ice Co., F. Bergman, Mgr., Noank Road, Noank, Conn., awarded contract for a 1 story, 60 x 90 ft. ice manufacturing plant, 20 ton daily capacity at Mystic to N. & S. Building Co., Main St., Norwich. Estimated cost $40,000.

Ice Plant—Liebmann's Independent Ice Co., 200 South Klein St., Oklahoma City, Okla., awarded contract for 1 story ice plant, 25 ton daily capacity at El Reno, to F. Corlee, El Reno. $25,000.

Ice Plant—J. A. McCurley, El Reno, Okla., will build a 1 story, 44 x 60 ft. ice plant, 20 ton daily capacity, including loading dock at Main St., Ada. Work will be done by local labor.

Ice Plant—Owner, c/o Guy Dale, 307 Koehler Bldg., Lawton, Okla., awarded general contract for a 1 story ice plant to Q. R. Shelton, 1324 First National Bank Bldg., Oklahoma City; machinery and equipment to Frick Co., American National Bank Bldg., Oklahoma City. Total cost $40,000.

Macaroni Factory—General Importing Macaroni Manufacturing Co., 63 Court St., Middletown, Conn., awarded contract for a 2 story addition to factory to E. Milardo, Midletown. Estimated cost $40,000.

Grain Elevator—Charles E. Hinson Grain Co., Graham, Tex., will build a grain elevator, 25,000 bu. capacity. Private plans. Work will be done by day labor.

Grain Elevator Addition—Burrus Panhandle Elevators, Amarillo, Tex., will build addition to grain elevator. Estimated cost $40,000. Private plans. Work will be done by owner's forces.

Beef Cooler — Leo Schloss Inc., Aster St., Newark, N. J., awarded contract for construction of a 1 story beef cooler to Essex Construction Co., 9 Hackett St., Newark. $40,000.

Packing Plant—John Morrell & Co., Ottumwa, Ia., awarded contract for construction of a 6 story, 120 x 160 ft. packing plant to Theodore Stark Construction Co., 1103 First Ave. S. W., Cedar Rapids. $400,000.

PATENT DIGEST

Baking and Milling

Dough Portions Delivered From Dividers to Higher Level by Means of Endless Belt Elevator Fitted With Flexible Pockets—Sigmund Shiff, to J. H. Day Co., Cincinnati, Ohio. No. 1,850,637. March 22, 1932.

Combination Dough Divider and Kneader—Gottfried Rausch, Ammendorf, Germany. No. 1,851,328. March 29, 1932.

Dough Prepared in Combination Unit for Mixing, Developing, and Conditioning—Herbert H. Hackstedde, Cincinnati, Ohio. No. 1,851,388. March 29. 1932.

Method of Baking Ice Cream Cones Which Prevents Sticking to Mold—Albert A. Heyman, Baltimore, Md. No. 1,851,578. March 29, 1932.

Correction—U. S. Patent No. 1,843,051, digested in the April issue, should be titled **"Method for Preparing Dough From Flour Containing as Much as One Per Cent of Added Vegetable Lecithin"**—Friedrich Wilhelm Thiele to Hanseatische Muhlenwerke Aktiengesellschaft, Hamburg, Germany. No. 1,843,051. Jan. 26, 1932.

Canning and Glass Packing

Creamed Foods for Canning Prepared by Incorporating Concentrated Broth in Homogenized Cream-like Mixture of Milk, Corn-Starch, Coconut Oil, Pepper, and Salt—Samuel F. Stickell, Brooklyn, N. Y., and John R. Poole, Hingham, Mass. No. 1,850,037. March 15, 1932.

Canned Food Conveyor Constructed to Tilt Can for Draining Before Placing in Filling Position—Chas. H. Ayars to Ayars Machine Co., Salem, N. J. No. 1,850,067. March 22, 1932.

Can Filling Mechanism That Operates in Connection With a Double-Seam Can Closing Machine—Jos. Cereghino, Los Angeles, Calif., to American Can Co., New York, N. Y. No. 1,850,200. March 22, 1932.

Endless Chain Type of Can Conveyor With Protruding Hinge Pins—John H. Burpee to E. B. Foster and Cecil A. Folsam, Bellingham, Wash. No. 1,848,603. March 8, 1932.

Confectionery

Means for Stacking Lozenges for Wrapping—Alfred W. Kath and Burton W. Scott to Arthur Colton Co., Detroit, Mich. No. 1,852,657. April 5, 1932.

Machine for String Decoration of Candy—Frank Petrovic to E. J. Brach & Sons, Chicago, Ill. No. 1,852,855. April 5, 1932.

Candy Polished by Means of a Motor-Driven Brushing Machine—Arthur B. Putzel to Quaker City Chocolate & Confectionery Co., Philadelphia, Pa. No. 1,853,996. April 12, 1932.

Dairy and Egg Products

Cheese and Fried Bacon Fat Homogeneously Emulsified to Form Food Product—Clinton Henry Parsons to Swift & Co., Chicago, Ill. No. 1,852,259. April 5, 1932.

Eggs Candled and Oil Coated in Combination Unit Machine—Harry E. Kennedy, Berkeley, Calif. No. 1,852,309. April 5, 1932.

Ice Cream Cut Into Block Form by Mechanical Means—Joseph Curtis Swinney, Chattanooga, Tenn. No. 1,852,630. April 5, 1932.

Receiving Vessel of Milking Machine With Filter in Cover and With Milk Inlet Designed to Prevent Milk From Striking Directly on Filter—Ernst Tage Jansson, Stockholm, Sweden, to DeLaval Separator Co., New York, N. Y. No. 1,849,672. March 15, 1932.

Cans of Milk Cooled by Being Placed in Individual Compartments Inside Large Cooling Tank Into Which Cooling Medium From Individual Compartments Overflows; Milk Continuously Agitated During Cooling—John W. Goble, Gosport, Ind. No. 1,850,500. March 22, 1932.

Butter Packed in Cup-Shaped Cartons—Howard A. Morris to Automat Molding & Folding Co., Toledo, Ohio. No. 1,851,981. April 5, 1932.

Small Malted Milk Masses Made Porous Under Vacuum—Austin A. Scott, Rockville Center, N. Y., to Nestlé's Food Co. Inc., New York, N. Y. No. 1,851,988. April 5, 1932.

Fruits and Vegetables

Juices Extracted From Citrus Fruit by Subjecting Whole Fruit to High Pressure, After Puncturing Skins—Ugo V. D'Annunzio, New York, N. Y., and Gino Finzi, Milan, Italy. No. 1,850,001. March 15, 1932.

Fresh Fruit Protected Against Blue Mold by Solution Containing Borax and Sodium Bisulphite—Ernest M. Brogden, Pomona, Calif., and Miles L. Trowbridge, Palms, Calif., to Brogdex Co., Winter Haven, Fla. No. 1,852,144. April 5, 1932.

Fruit Washer and Dryer—Treffle Farley, one-half to William McGonagle, Yakima, Wash. No. 1,852,405. April 5, 1932.

Olives Packed in Flavored Brine, Covered With Layer of Edible Oil, Cooked and Sterilized Under Seal—Alexander B. Stewart to Stewart Curtis Packers, Inc., Los Angeles, Calif. No. 1,852,941. April 5, 1932.

Raisins Treated With Glycerol to Form Protective Film—John D. Segur, Chicago, Ill., and Kenneth H. Hoover, Deerfield, Ill., to Association of American Soap and Glycerine Producers, Inc. No. 1,853,151. April 12, 1932.

Dates Cleaned and Surface Treated With Glycerol—John B. Segur, Chicago, Ill., and Kenneth Hoover, Deerfield, Ill., to Association of American Soap and Glycerine Producers, Inc. No. 1,853,152. April 12, 1932.

Paper Wrappers Mechanically Removed From Tomatoes—Niels B. Janssen, Kansas City, Mo. No. 1,853,816. April 12, 1932.

General Equipment

Food Grinder With Seat for Feed Shaft to Direct Juices Toward Discharge End of Cutter—Walter F. Stimpson and William W. Dryden to Walter F. Stimpson, Louisville, Ky. No. 1,851,653. March 29, 1932.

Open-Top Carton Wrapped With Transparent Material for Merchandising Frozen Foods—Clarence Birdseye, Gloucester, Mass., to Frosted Foods Co., Inc., Dover, Del. No. 1,852,228. April 5, 1932.

Copies of Patents

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

Photostatic copies of foreign patents may be obtained at the same address, prices being forwarded on application.

Copies of patents should be ordered by number, as titles used in this digest seldom correspond with title of patent.

Meat Packing

Meat Moving on Horizontal Conveyor Marked by Rotary Punctiform Brand—Harry H. McKee to Swift & Co., Chicago, Ill. No. 1,849,407. March 15, 1932.

Meat Molded Into Familiar Cut Forms and Cooled—Roy W. Johns to Swift & Co., Chicago, Ill. No. 1,849,457. March 15, 1932.

Frozen Meats Defrosted by Treatment With Water, Warm Air, and Subsequently With Blasts of Cooled Air While in a Rotating Motion—Arthur Rayson to Anglo-Australian Defreezing Co. Proprietary, Ltd., Melbourne, Victoria, Australia. No. 1,850,031. March 15, 1932.

Meat Product Formed and Cooked in Airtight Pressure Cooker—Henry Janssen, one-half to Gustave F. Kuhn, Philadelphia, Pa. No. 1,851,582. March 29, 1932.

Miscellaneous Products and Processes

Suction Cylinder Device for Handling Containers in Packaging of Sugar—Charles Schuchmann, St. Albans, N. Y. No. 1,851,451. March 29, 1932.

Cocoa Waste Products Source of Theobromine—Hermann Schreiber, Hamburg, Germany, to C. H. Broehringer Sohn, Nieder-Ingelheim-on-the-Rhine, Germany. No. 1,851,872. March 29, 1932.

Crushing and Disintegrating Rotary Mill for Extraction of Juice From Sugar Cane—Francis Maxwell, Wallington, England. No. 1,852,055. April 5, 1932.

Hop Flavored Malt Extract Prepared in Powdered Form—Charles J. Koch, Kirkwood, Mo. No. 1,852,418. April 5, 1932.

THE GOVERNMENT PUBLISHES

DOCUMENTS ARE AVAILABLE *at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated pamphlet is free and should be ordered from bureau responsible for its issue.*

Preventing Dust Explosions. Bureau of Labor Statistics, Bulletin 562; 15 cents. A reprinting of the nine safety codes for the prevention of dust explosions, most of which codes relate to food manufacture or handling, including starch, flour and feed, grain elevators, sugar and cocoa pulverizing, spice grinding and the use of inert gas for fire and explosion prevention. The codes are American standards formulated by National Fire Protection Association and U. S. Department of Agriculture under American Standards Association procedure.

Iron Content of Vegetables and Fruit, by Hazel K. Stiebeling. Department of Agriculture, Circular 205; 5 cents.

Yearling Beef Grades, by W. C. Davis. Department of Agriculture, Circular 208; 20 cents.

Storing Frozen Fish, by James M. Lemon. Bureau of Fisheries, Investigational Report No. 3; 5 cents. A discussion of the means for reducing the shrinkage of frozen fish during cold storage by use of an oil "glaze" in place of the customary ice glaze.

Bean Standards. Unnumbered pamphlet, Bureau of Agricultural Economics; 10 cents. 1931 revision of the handbook of official standard for beans.

Foreign Tariffs, by Henry Chalmers. Bureau of Foreign and Domestic Commerce, T. I. B. 790; 10 cents. A review of the current trends in foreign tariffs and commercial policies of other countries than the United States.

Milk Bottle Handling, by C. E. Clement, J. B. Bain, and Fred M. Grant. Department of Agriculture, Technical Bulletin 280; 10 cents. Effect of plant arrangement, equipment, and methods of operation in relation to breakage of bottles in milk plants.

Plant Industry Directory. Department of Agriculture, Miscellaneous Publication 129. A directory of field activities of the Bureau of Plant Industry.

Market Research Sources. Bureau of Foreign and Domestic Commerce, Domestic Commerce Series No. 55; 30 cents. A guide to the sources of information on domestic marketing, 1932 edition.

Pineapples. U. S. Tariff Commission, Report No. 40, Second Series; 5 cents. Report to the President on the differences in costs of production of pineapples in the United States and in the principal competing country, as ascertained pursuant to the provisions of section 336 of Title III of the Tariff Act of 1930.